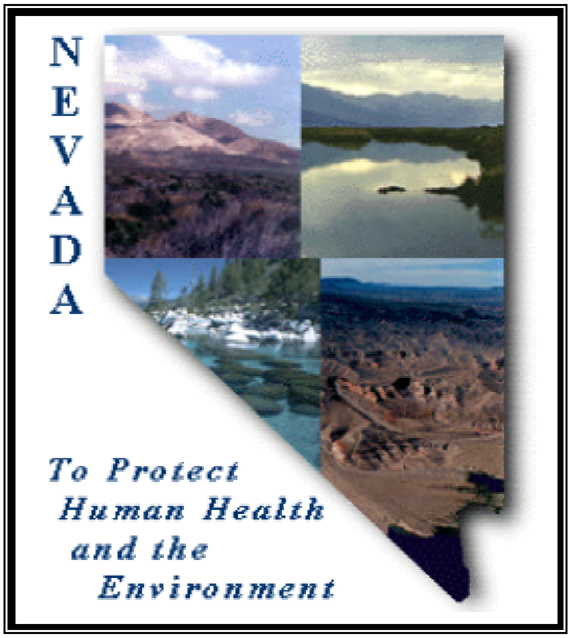


Revised Air Quality Modeling Report

Assessment of PSD Increment
in the
Fernley Area and Truckee River Corridor

Prepared for

State of Nevada
Division of Environmental Protection

Prepared by

Tetra Tech EM Inc.
4940 Pearl East Circle, Suite 100
Boulder, Colorado 80301

August 2003

CONTENTS

CONTENTS (Continued)

TABLES

FIGURES

EXECUTIVE SUMMARY

GOALS

The objective of this modeling analysis was to evaluate and document the current status of Prevention of Significant Deterioration (PSD) increment in Nevada's hydrographic areas 76, 83, and 85 (HA76, HA83, and HA85), while establishing a PSD increment tracking system. To achieve these objectives, a PSD increment source inventory was developed and PSD increment modeling was completed.

This report represents a revised version of the previously completed PSD impact modeling conducted for the Air Quality Modeling Report: Assessment of PSD Increment in the Fernley Area and Truckee River Corridor, as originally provided to the Nevada Division of Environmental Protection (NDEP) on March 14, 2002. Tetra Tech updated the PSD increment analyses for Air Quality Control Regions (AQCRs) HA76, HA83, and HA85.

PROJECT PHASES

The state of PSD increments in HA76, HA83, and HA85 was evaluated and the increment tracking system produced in seven project phases. Each phase included components for emissions inventorying, information technology (IT), and geographic information system (GIS). Details about the seven phases explain how current PSD increment was modeled and how the PSD increment tracking system was developed.

PSD INCREMENT

PSD regulations are intended to help preserve existing clean air resources while still allowing economic growth, and PSD increments are an important part of the program to achieve this objective. PSD increments are the maximum permissible level of increased air quality impacts that may occur beyond a baseline air quality level. Allowable PSD increments have been established for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and particulate matter smaller than 10 microns (PM_{10}) but do not exist for other pollutants. It is important to note that regulations do not allow total air quality impacts beyond the applicable National Ambient Air Quality Standards (NAAQS) limits, even if all the PSD increment is not consumed (EPA 1990).

PSD increments are tracked on a pollutant-by-pollutant and planning area by planning area basis. PSD increments are only affected by changes to the inventory of sources and emissions since the baseline date that meet specific regulatory criteria. PSD increment impacts represent net air quality impacts in a triggered planning area, or the change compared to baseline conditions, resulting from applicable changes to pollutant sources. The effect of applicable changes on PSD increments is tracked by calculating net air quality impacts through the use of air quality dispersion models. Net changes can effectively result in either a lower air quality impact, referred to as increment expansion, or a higher air quality impact, referred to as increment consumption.

Net changes to the PSD increment are tracked on two key baseline dates, one for minor sources of the pollutant of concern and one for major sources of the pollutant of concern. Minor source baseline dates are established according to permitting activities in each planning area, while major source baseline dates are established within the Code of Federal Regulations (CFR) for each pollutant on a nationwide basis.

After the minor source baseline date for SO_2, NO_2, or PM_{10} is triggered in a planning area, PSD increment is impacted due to emissions from:

1. Changes at minor stationary sources and any area or mobile sources within the triggered planning area following the minor source baseline date for a particular pollutant for that planning area.

2. Changes at major sources within or outside the planning area following the major source baseline date for a particular pollutant.

The increases and decreases in impacts of triggered pollutants are primarily associated with construction at major stationary sources after the major source baseline date, or with any changes after the minor source baseline date at major or minor stationary sources and any area or mobile sources of the triggered pollutant.

EMISSION INVENTORIES

Emission rates used in each of the modeled scenarios were based on the emission inventories that were compiled for the current date and each baseline date. Sources of stationary point sources include the NDEP Paradox database; NDEP and Washoe County historical files; Nevada Minerals Industry Listings; permit applications from applicable sources; and State Mines Inspection Reports for the minor and major source baseline dates. The information gathered from these sources provided a comprehensive background for stationary sources within HA76, HA83, and HA85 for the emission inventories. Tetra Tech was also able to use the Aerometric Information Retrieval System Database (AIRData) National Air Pollutant Emission Trends (NET) to identify railroad, vehicle, and miscellaneous fugitive emissions on a countywide basis for the current date and minor source baseline dates.

PSD INCREMENT MODELING RESULTS

Based on the dispersion modeling analysis performed, there are no SO_2 PSD increment exceedences predicted in HA76, HA83, or HA85. Additionally, there were no annual PM_{10} PSD increment exceedences predicted in HA83. There are several NO_2 exceedences predicted along I-80 in the northeastern part of HA83. There are also several 24-hour PM_{10} PSD increment exceedences predicted in HA83 near the All-Lite Aggregate facility.

INCREMENT TRACKING SYSTEM

An Increment Tracking System (ITS), database and GIS desktop application was developed to permit access to major and minor source baseline information, annual emissions data, and permitted emissions data. The ITS provides users with a user-friendly graphical user interface (GUI) for entering data, querying data, generating model input files, and reporting capabilities. The ITS will be used to provide local planners, developers and industry with the tools necessary to assure maintenance of air quality within allowable limits.

1.0 INTRODUCTION

This effort was undertaken by Tetra Tech EM Inc. (Tetra Tech) to provide technical analysis and project coordination services to the Nevada Division of Environmental Protection (NDEP) Bureau of Air Pollution Control (BAPC) and Bureau of Air Quality Planning (BAQP) to accurately evaluate and document the current status of Prevention of Significant Deterioration (PSD) increments in hydrographic areas 76, 83, and 85 (HA76, HA83, and HA85). The information and tools that result from the project can be used to provide local planners, developers and industry with the tools necessary to assure maintenance of air quality within allowable limits.

This report represents a revised version of the previously completed PSD impact modeling conducted for the Air Quality Modeling Report: Assessment of PSD Increment in the Fernley Area and Truckee River Corridor, as originally provided to BAPC and BAQP on March 14, 2002. Tetra Tech updated the PSD increment analyses for Air Quality Control Regions (AQCRs) HA76, HA83, and HA85. The updates to the Truckee River Corridor study involved the use of the AERMOD dispersion model. The AERMOD dispersion model used was an executable version of the FORTRAN code compiled using an up to date version of the Lahey FORTRAN-90 compiler. The FORTRAN code was obtained directly from EPA, and the only modifications made to the code were for the purpose of increasing the source and receptor array sizes. The emission source inventory updates included updates to the Kal Kan, All-Lite, Eagle-Picher, Alcoa, and Sierra Pacific Power Company (SPPCo) Tracy facility source data. The proposed modeling used the full receptor sets established in the original Truckee River Corridor study for each AQCR. The most recent two years of AERMET processed meteorological data available, 2000 and 2001, were used for current impact modeling. Baseline modeling was accomplished using meteorological data years 2000 and 2001 for HA76, 1993 for HA83, and 1995 for HA85. Revised PSD increment impacts for HA83 and HA85 using the new source data were calculated using an unpaired-in-time analysis that subtracts the baseline impacts from the current impacts. However, a paired-in-time approach was used to determine the HA76 increments because a complete set of baseline 1982 meteorological data was not available.

This report is organized to give the reader some background about the project's goals and phases, as well as background on the regulations driving this project. The report then describes key components in the project, such as the emission inventory and air quality modeling of the PSD increment in HA76, HA83, and HA85. The final section of the report summarizes the results of the PSD increment study and Tetra Tech's recommendations for future actions. All modeling files used in this study are presented in Appendix A.

2.0 BACKGROUND

The evaluation focused on the air quality planning areas HA76, HA83, and HA85 because the minor source baseline dates have been triggered in these HAs by PSD permit applications for major sources. In the Fernley area, the sulfur dioxide (SO_2) minor source baseline date was triggered for HA76 on October 26, 1982 as a result of an application submitted by Nevada Cement Company. In the Truckee River Corridor, the SO_2, nitrogen dioxide (NO_2), and particulate matter smaller that 10 microns (PM_{10}) minor source baseline dates were triggered for HA83 on March 11, 1994, and the SO_2 minor source baseline date was triggered for the planning area represented by HA85 on January 9, 1996, each as a result of permit applications submitted by Sierra Pacific Power Company for modifications at the Tracy Generating Station. Because the minor source baseline dates were triggered in the planning area, PSD increment must be tracked to ensure that air quality does not deteriorate beyond the specified regulatory increment for each of the triggered pollutants.

The PSD increment evaluation is based on the changes in modeled concentrations of airborne contaminants from pollutant emissions as of the major or minor baseline dates compared with modeled concentrations from current pollutant emissions. PSD increment impacts occur with changes to affected stationary, area, or mobile sources that existed as of the major and minor baseline dates. Changes that affect PSD increment impacts include increasing or decreasing emissions, increasing or decreasing effective stack height, changing the orientation of the stack (vertical or horizontal), and moving the location of a source.

Emission inventories were developed for each applicable pollutant, planning area, and baseline date using data from sources that included NDEP records, the U. S. Environmental Protection Agency's (EPA) Aerometric Information Retrieval System Database (AIRData), National Air Pollutant Emission Trends (NET) database, and Nevada Department of Transportation (NDOT) records. Baseline emission source data represent stationary source operations as of a given baseline date, and were based on available records from the closest date prior to the baseline date. In other words, Tetra Tech used emission data as near to the baseline date as possible where records exist, but before the baseline trigger date. In some cases, the only recorded emission data are two to three years prior to a given baseline date. Fugitive emissions caused by railroads, vehicles, and miscellaneous sources also consume PSD increment after the minor source baseline date. Therefore, minor source baseline inventories and the current emission inventory included fugitive emissions. The EPA maintains some records of these fugitive emissions for each county in every state in the AIRData NET database.

After the emission inventories were established, modeling was completed for each PSD triggered pollutant in HA76, HA83, and HA85. The results from modeling each emission inventory scenario were compared with modeling results from the current situation for each HA and pollutant. This analysis used the American Meteorological Society/EPA Regulatory Model Improvement Committee Dispersion Model (AERMOD). This model was selected for the study because EPA is in the process of adopting this model for regulatory use, and Tetra Tech and NDEP want to ensure that the PSD increment tracking system developed using this model is not outdated when the upgrade occurs. The algorithms AERMOD uses to model terrain effects are more complex than in the Industrial Source Complex Short-Term Model Version 3 (ISCST3), which is the current EPA dispersion model of choice.

An Increment Tracking System (ITS), database and geographic information system (GIS) desktop application was developed to permit access to major and minor source baseline information, annual emissions data, and permitted emissions data. The ITS combines the relational database capabilities of Microsoft Access with the spatial analysis capability of ArcView (a geographic information system) to provide the BAPC and BAQP a desktop application that will improve the current method of storing, maintaining, retrieving, and presenting emissions data. Additionally, the ITS generates AERMOD model input data, using user defined parameters, and imports, stores, and presents post–processed AERMOD output files to provide BAPC and BAQP a method of archiving and reviewing results from model runs. The ITS provides users with a user-friendly graphical user interface (GUI) for entering data, querying data, generating model input files, and reporting capabilities. Appendix B describes the ITS. Appendix C presents the final output maps.

2.1 GOALS

The objective of the analysis was to evaluate and document the current status of PSD increments in HA76, HA83, and HA85, while establishing a PSD increment tracking system. To achieve these objectives, PSD increment source inventories and PSD increment modeling were completed. The following interim goals were established and attained throughout the project:

- Identify and collect data on major point sources within a 50-kilometer (km) radius of HA76, HA83, and HA85 for facilities in operation as of the baseline dates for major sources for each pollutant
- Identify and collect data on point sources and area fugitive emissions for operations in the planning areas as of the appropriate baseline dates for each pollutant
- Identify and collect data for current major and minor point sources and area fugitive emissions for PM_{10}, nitrogen oxides (NO_x), and SO_2
- Develop emission inventories that pertain to each HA for baseline dates and the affiliated pollutants
- Create an initial PSD increment tracking system database

- Model each emission inventory scenario and subtract results for the baseline date from results for the current date to calculate existing PSD increment consumption and expansion
- Display PSD modeling results using GIS technology

The following section describes the project phases and how these goals were achieved.

2.2 PROJECT PHASES

The state of increment consumption in HA76, HA83, and HA85 was evaluated, and the increment tracking system was produced in seven project phases. Each phase included components for emissions inventorying, information technology (IT), and GIS. The seven phases described in the following sections explain how current PSD increment consumption was modeled and how the PSD increment tracking system was developed. Figure 2-1 is a flow diagram that shows the progression of the seven phases.

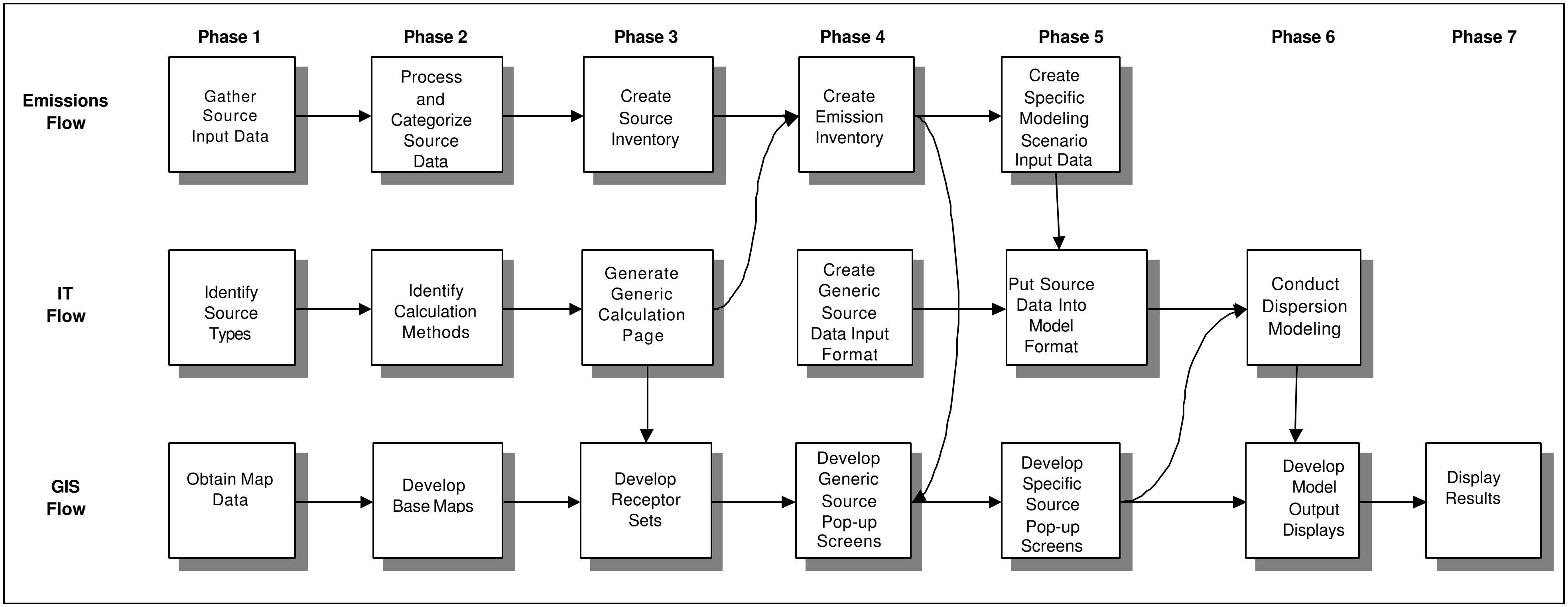
2.2.1 Phase I

In this phase, the project team met to explore the scope of the project and to fully explain the remaining six phases of the project. The project team was made up of air quality scientists, IT specialists, and GIS specialists. During Phase I, air quality scientists investigated sources of emissions data. They sought out available information on the Internet and selected the information that should be included in the investigation. Tetra Tech identified the source types that would be entered into the database, and established the parameters that would be needed in the database for both point and fugitive sources. Map data were obtained from the U.S. Geological Survey (USGS) and the U.S. Bureau of the Census for the study area during this phase.

2.2.2 Phase II

During Phase II, Tetra Tech decided how the data collected would be used in an interactive format to produce emission inventories, an increment tracking system, and a graphical representation of increment consumption in the planning areas. The information on point sources was processed and categorized so it would be ready for input into an emission inventory for each of the baseline dates. The project team identified database themes that would be used for the increment tracking system. These themes consisted of emission calculation fields as well as point source parameter fields. The team then developed base maps for each HA. The maps displayed each HA with area grid cells as an overlay. The maps also showed the interstate highways and railroads that pass through HA76, HA83, and HA85.

FIGURE 2-1
PREVENTION OF SIGNIFICANT DETERIORATION INCREMENT STUDY PROJECT FLOW DIAGRAM



2.2.3 Phase III

The third phase of the project focused mainly on compiling the point source inventory. Tetra Tech finished categorizing the point sources, and then organized the data from the source inventory into a usable format for the IT database. Data on fugitive emissions were also collected and apportioned into the grid cells of each HA for the baseline dates for minor sources. Receptor sets were created for use in modeling the PSD increment for each HA.

2.2.4 Phase IV

The project team completed emission inventories for each baseline date, pollutant and HA during Phase IV. A generic source data input format was developed from the nearly complete emission inventories for each baseline date. This format enabled the database to produce information on point sources in an AERMOD input file format. Additionally, the project team developed generic emissions pop-up screens, which became templates for the final increment tracking system, as point and area source emissions data became available.

2.2.5 Phase V

Phase V was the modeling phase, and specific modeling scenarios were created during this phase. Tetra Tech processed the meteorological data with the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee Dispersion Model (AERMOD) meteorological preprocessor (AERMET), and assigned elevations to the receptor sets using the AERMOD terrain processor (AERMAP). The point and area source data were put into model format. The results were model input files for each modeling scenario. The pop-up screens for the increment tracking system were finalized.

2.2.6 Phase VI

The sixth phase involved the dispersion modeling for each scenario and development of displays of model output for the increment tracking system. The project team completed a quality assurance/quality control (QA/QC) check of the model runs and refined the model. The modeling results indicated the state of PSD increment consumption in the three HAs. GIS output displays show the modeling results in a map format.

2.2.7 Phase VII

GIS output displays and the final report were completed during Phase VII.

2.3 PSD INCREMENT

PSD increments are the maximum permissible level of increased air quality impacts, due to sources and emissions meeting regulatory criteria, which may occur beyond a regulatory baseline air quality level. PSD regulations in Title 40 of the Code of Federal Regulations, Part 52 Subpart 21 (40 CFR 52.21) establish PSD increments. Allowable PSD increments have been established for SO_2, NO_2, and PM_{10} for various averaging periods. Allowable PSD increments do not exist for other pollutants. PSD regulations are intended to preserve existing clean air resources and allow for economic growth. PSD increments are an important part of the program to achieve this objective. PSD increments are designed to protect against excessive deterioration of air quality. It is important to note that regulations do not allow ambient air quality to exceed the applicable National Ambient Air Quality Standards (NAAQS) limits, even if all the PSD increment is not consumed (EPA 1990).

PSD increments are tracked on a pollutant-by-pollutant and planning area by planning area basis. PSD increment impacts represent net air quality impacts in a triggered planning area, compared to baseline conditions. PSD increments result from applicable changes to sources of the pollutant of concern. The effect of applicable changes on PSD increments are tracked by calculating net air quality impacts through the use of air quality dispersion models. Net changes can result in either a lower air quality impact, referred to as increment expansion, or a higher air quality impact, referred to as increment consumption. The rules in 40 CFR 52.21 establish the maximum allowable increment consumption for SO_2, NO_2, and PM_{10} for various averaging periods.

PSD increment net changes are tracked relative to baseline impact conditions on two key baseline dates, one for minor sources of the pollutant of concern and one for major sources of the pollutant of concern. This results in the establishment of minor source baseline dates and major source baseline dates for each pollutant, SO_2, NO_2, and PM_{10}. Minor source baseline dates are established according to permitting activities in each planning area, while major source baseline dates have been established within the CFR for each pollutant on a nationwide basis. Emission inventories were established for the pollutants of concern relative to the applicable baseline dates.

PSD increment impacts are not tracked and have no regulatory bearing in a given planning area before the minor source baseline date is established in that planning area for a particular pollutant. After the minor source baseline date for SO_2, NO_2, or PM_{10} is triggered in a planning area, PSD increments of that pollutant must be quantified based on:

1. All quantifiable changes at minor stationary sources and any changes to area or mobile sources within the triggered planning area since the minor source baseline date.
2. Formal changes at major sources within (or outside, but with the ability to affect) the planning area following the major source baseline date for a particular pollutant.

Minor source and major source baseline dates have different source change criteria that establish affects on PSD increment. The changes in impacts of triggered pollutants are primarily associated with construction at major stationary sources after the major source baseline date, or with any changes after the minor source baseline date at major and minor stationary sources and any quantifiable changes to area or mobile sources of the triggered pollutant.

Major source baseline dates establish the basis for tracking impacts from construction at major sources and were set when the PSD increment consumption regulations were promulgated for the given pollutant. Baseline source data on major sources that existed as of the major source baseline date are identified to establish baseline conditions. The impacts resulting from changes to source emissions and parameters associated with construction or other permitted activities since the major source baseline date affect the available increment. The baseline dates for major sources are set nationwide as follows:

- January 6, 1975 – for SO_2 and PM_{10}
- February 9, 1988 – for NO_2

It is important to note that the increment is not affected in a planning area until the minor source baseline date for a particular pollutant, SO_2, NO_2, or PM_{10}, is triggered for that planning area. When a major stationary source submits a major PSD permit modification of SO_2, NO_2, or PM_{10} emissions, or a new stationary source submits a permit application that shows it is a major source for SO_2, NO_2, or PM_{10} and the application is deemed complete, the pollutant-specific minor source baseline date is triggered in the planning area the major source is located in. Planning areas that have a triggered minor source baseline dates are those where an applicable new or modified stationary source is located, and/or where the change in increment consuming emissions has a potential to increase the ambient concentrations by 1 microgram per cubic meter ($\mu g/m^3$) or more.

Minor source baseline dates mark the beginning of accounting for 3increment consumption and/or expansion. After the minor source baseline date is triggered, increment is consumed and/or expanded in the planning area by impacts attributable to changes at any major sources or at minor and fugitive sources in the planning area. Tracking increments requires maintaining records on changes to all major sources and changes to minor sources and fugitive emissions located in a triggered planning area.

Minor source baseline dates applicable to the study areas are:

- October 26, 1982 – HA76 was triggered for SO_2 by an application from Nevada Cement for a 3rd Kiln.
- March 11, 1994 – HA83 was triggered for SO_2, NO_2 and PM_{10} by an application from Sierra Pacific Power Company for the Piñon Project.
- January 9, 1996 – HA85 was triggered for SO_2 by an application from Sierra Pacific Power Company for the Clark Mountain Turbine modification.

3.0 EMISSIONS INVENTORY

Dispersion modeling was used to establish the current status of PSD increment consumption in HA76, HA83, and HA85. Emission rates used in each of the modeled scenarios were based on the emission inventories that were compiled for the current date and each baseline date for each applicable pollutant. The following sections explain how the emission inventories were established, and describe the source types included in the inventories.

In this analysis of NDEP-regulated sources, actual emissions data were used to the greatest possible extent in developing the baseline date inventories. Actual emissions were based on available NDEP records, EPA's AIRS and NET databases, and NDOT records. When actual emission rates were not available or could not be reliably estimated, potential emission rates were used for baseline data. When information about the startup date of a stationary source was not available, the analysis assumed that the source is completely increment consuming. Permitted emissions from 1998 and 1999 were used in developing the current date inventories for PSD triggered pollutants. The method of assuming that a stationary source is completely increment consuming if baseline data were not available results in modeled impacts that will maximize predicted increment consumption from that source.

3.1 METHODOLOGY

Tetra Tech began the stationary source data search by looking at various databases and other sources of information to gather names of facilities in HA76, HA83, and HA85. Sources of information included the NDEP Paradox database, NDEP, and Washoe County historical files, Nevada Minerals Industry Listings, and State Mines Inspection Reports for the minor and major source baseline dates. The information gathered from these sources provided a comprehensive background for stationary sources within HA76, HA83, and HA85 for the emission inventories.

Tetra Tech searched for data on fugitive emissions by investigating the availability of information in EPA's AIRData NET database. The NET Tier report includes information that is pertinent to the emissions study for the HAs. The report provides annual area and point source emission totals for each county on a pollutant-by-pollutant basis, as well as information about the origin of the pollutant. The report organizes each source into one of 14 major Tier 1 categories, and further classifies the sources with one of 75 more detailed Tier 2 categories. Tetra Tech was able to identify railroad, vehicle, and miscellaneous fugitive emissions on a countywide basis with this information. Table 3-1 illustrates how information in the NET Tier database is organized.

TABLE 3-1
EXAMPLE NATIONAL EMISSION TREND TIER REPORT FOR 1998 NO_x EMISSIONS

Tier-1	Tier-2	County	State	Area Source Emissions (tpy)	Point Source Emissions (tpy)
02-Fuel Comb. Industrial	01-Coal	Churchill	NV	3	0
02-Fuel Comb. Industrial	02-Oil	Churchill	NV	2	0
02-Fuel Comb. Industrial	03-Gas	Churchill	NV	1	31
03-Fuel Comb. Other	02-Commercial/Institutional Oil	Churchill	NV	2.33E-01	0
03-Fuel Comb. Other	03-Commercial/Institutional Gas	Churchill	NV	1.46E-01	0
03-Fuel Comb. Other	05-Residential Wood	Churchill	NV	43	0
03-Fuel Comb. Other	06-Residential Other	Churchill	NV	1	0
07-Other Industrial Processes	05-Mineral Products	Churchill	NV	0	300
10-Waste Disposal & Recycling	01-Incineration	Churchill	NV	170	0
10-Waste Disposal & Recycling	02-Open Burning	Churchill	NV	78	0
11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	Churchill	NV	10	0
11-Highway Vehicles	02-Light-Duty Gas Trucks	Churchill	NV	8	0
11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	Churchill	NV	2	0
11-Highway Vehicles	04-Diesels	Churchill	NV	43	0
12-Off-Highway	01-Non-Road Gasoline	Churchill	NV	13	0
12-Off-Highway	02-Non-Road Diesel	Churchill	NV	27	0
12-Off-Highway	03-Aircraft	Churchill	NV	219	0
12-Off-Highway	05-Railroads	Churchill	NV	5	0
13-Natural Sources	02-Geogenic	Churchill	NV	97	0
14-Miscellaneous	01-Agriculture & Forestry	Churchill	NV	342	0
14-Miscellaneous	02-Other Combustion	Churchill	NV	2.18E-01	0
14-Miscellaneous	07-Fugitive Dust	Churchill	NV	7370	0
01-Fuel Comb. Elec. Util.	02-Oil	Lyon	NV	0	1
01-Fuel Comb. Elec. Util.	03-Gas	Lyon	NV	0	2
02-Fuel Comb. Industrial	01-Coal	Lyon	NV	1	0
02-Fuel Comb. Industrial	02-Oil	Lyon	NV	1	0
02-Fuel Comb. Industrial	03-Gas	Lyon	NV	1.85E-01	0
03-Fuel Comb. Other	02-Commercial/Institutional Oil	Lyon	NV	1.30E-01	0
03-Fuel Comb. Other	03-Commercial/Institutional Gas	Lyon	NV	7.27E-02	0
03-Fuel Comb. Other	05-Residential Wood	Lyon	NV	27	0
03-Fuel Comb. Other	06-Residential Other	Lyon	NV	2	0
05-Metals Processing	01-Non-Ferrous Metals Processing	Lyon	NV	0	385
07-Other Industrial Processes	05-Mineral Products	Lyon	NV	0	2076
07-Other Industrial Processes	10-Miscellaneous Industrial Processes	Lyon	NV	5	0
09-Storage & Transport	11-Bulk Materials Storage	Lyon	NV	0	4
10-Waste Disposal & Recycling	01-Incineration	Lyon	NV	4	0
10-Waste Disposal & Recycling	02-Open Burning	Lyon	NV	33	0
11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	Lyon	NV	13	0
11-Highway Vehicles	02-Light-Duty Gas Trucks	Lyon	NV	10	0
11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	Lyon	NV	3	0
11-Highway Vehicles	04-Diesels	Lyon	NV	55	0
12-Off-Highway	01-Non-Road Gasoline	Lyon	NV	4	0
12-Off-Highway	02-Non-Road Diesel	Lyon	NV	47	0
12-Off-Highway	03-Aircraft	Lyon	NV	1	0
12-Off-Highway	05-Railroads	Lyon	NV	5	0
13-Natural Sources	02-Geogenic	Lyon	NV	43	0
14-Miscellaneous	01-Agriculture & Forestry	Lyon	NV	311	0
14-Miscellaneous	02-Other Combustion	Lyon	NV	19	0
14-Miscellaneous	07-Fugitive Dust	Lyon	NV	9185	0
01-Fuel Comb. Elec. Util.	02-Oil	Storey	NV	0	1
01-Fuel Comb. Elec. Util.	03-Gas	Storey	NV	0	2
03-Fuel Comb. Other	01-Commercial/Institutional Coal	Storey	NV	1.12E-02	0
03-Fuel Comb. Other	02-Commercial/Institutional Oil	Storey	NV	8.76E-02	0
03-Fuel Comb. Other	03-Commercial/Institutional Gas	Storey	NV	2.30E-02	0
03-Fuel Comb. Other	05-Residential Wood	Storey	NV	24	0
03-Fuel Comb. Other	06-Residential Other	Storey	NV	1.95E-01	0
10-Waste Disposal & Recycling	01-Incineration	Storey	NV	75	0
11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	Storey	NV	2	0
11-Highway Vehicles	02-Light-Duty Gas Trucks	Storey	NV	2	0

TABLE 3-1 (Continued)
EXAMPLE NATIONAL EMISSION TREND TIER REPORT FOR 1998 NO_x EMISSIONS

Tier-1	Tier-2	County	State	Area Source Emissions (tpy)	Point Source Emissions (tpy)
11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	Storey	NV	4.73E-01	0
11-Highway Vehicles	04-Diesels	Storey	NV	9	0
12-Off-Highway	01-Non-Road Gasoline	Storey	NV	1.63E-01	0
12-Off-Highway	02-Non-Road Diesel	Storey	NV	2	0
12-Off-Highway	03-Aircraft	Storey	NV	1.77E-02	0
12-Off-Highway	05-Railroads	Storey	NV	1	0
14-Miscellaneous	01-Agriculture & Forestry	Storey	NV	178	0
14-Miscellaneous	02-Other Combustion	Storey	NV	3.07E-02	0
14-Miscellaneous	07-Fugitive Dust	Storey	NV	2241	0
02-Fuel Comb. Industrial	01-Coal	Washoe	NV	31	0
02-Fuel Comb. Industrial	02-Oil	Washoe	NV	26	0
02-Fuel Comb. Industrial	03-Gas	Washoe	NV	6	0
03-Fuel Comb. Other	01-Commercial/Institutional Coal	Washoe	NV	1	0
03-Fuel Comb. Other	02-Commercial/Institutional Oil	Washoe	NV	7	0
03-Fuel Comb. Other	03-Commercial/Institutional Gas	Washoe	NV	14	0
03-Fuel Comb. Other	05-Residential Wood	Washoe	NV	22	0
03-Fuel Comb. Other	06-Residential Other	Washoe	NV	21	0
07-Other Industrial Processes	05-Mineral Products	Washoe	NV	0	34
07-Other Industrial Processes	10-Miscellaneous Industrial Processes	Washoe	NV	78	0
09-Storage & Transport	11-Bulk Materials Storage	Washoe	NV	0	2
10-Waste Disposal & Recycling	01-Incineration	Washoe	NV	7	0
10-Waste Disposal & Recycling	02-Open Burning	Washoe	NV	78	0
10-Waste Disposal & Recycling	07-Other	Washoe	NV	0	118
11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	Washoe	NV	76	0
11-Highway Vehicles	02-Light-Duty Gas Trucks	Washoe	NV	55	0
11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	Washoe	NV	11	0
11-Highway Vehicles	04-Diesels	Washoe	NV	198	0
12-Off-Highway	01-Non-Road Gasoline	Washoe	NV	57	0
12-Off-Highway	02-Non-Road Diesel	Washoe	NV	330	0
12-Off-Highway	03-Aircraft	Washoe	NV	27	0
12-Off-Highway	05-Railroads	Washoe	NV	71	0
13-Natural Sources	02-Geogenic	Washoe	NV	23	0
14-Miscellaneous	01-Agriculture & Forestry	Washoe	NV	177	0
14-Miscellaneous	02-Other Combustion	Washoe	NV	63	0
14-Miscellaneous	07-Fugitive Dust	Washoe	NV	20268	0

The NET database has been used to track fugitive emissions since 1985, when EPA promulgated the emissions reporting program (http://www.epa.gov/air/data). The NET Tier database search was completed for the baseline dates and pollutants of concern. The sections below give more details about stationary source and fugitive emissions.

3.2 STATIONARY SOURCE EMISSION INVENTORY

NDEP and Washoe County historical files, along with the NDEP Paradox database, provided lists of state-permitted facilities. The Nevada Minerals Industry Listings and the State Mines Inspection Reports provided source names and locations of mining operations active during each of the baseline years. Historical air quality permits and emission inventory reports for facilities in the study area at both NDEP and Washoe County provided emission rates and source parameters for stationary sources for the emission inventories. Major and minor sources were reviewed for each HA for major and minor baseline dates. Additionally, major sources within a 50-km radius of the HAs were reviewed for each of the inventories. Emission data gathered for the 1975, 1982, 1988, 1994, and 1996 baseline years included primarily energy-generating sources and mining operations.

Emissions data for all known sources that currently exist were gathered to create the current inventory. The period for the current inventory is 1998 through 1999 because the databases used in the estimates of emissions have been largely updated with 1999 data. The current inventory is based on permitted emission rates. Tetra Tech assumed the source is increment consuming when information about the startup date of the stationary source was not available. For this Truckee River Corridor study, several facilities have updated emissions data because of a new permit or a permit modification that was approved by NDEP in 2002. The emissions changes due to these permitting changes are incorporated in to this revised increment impact analysis.

3.2.1 Stationary Source Data Collection

To establish the stationary source inventory, BAPC and BAQP emission source data, historical air quality permits, and recent annual emission inventories for SO_2, NO_2, and PM_{10} were reviewed. Stationary sources located in HA76, HA83, and HA85 were ranked according to permitted facility-wide annual emissions of SO_2, NO_2, and PM_{10}. This procedure allowed Tetra Tech to identify the stationary sources that were major sources of a particular pollutant. Source histories from the Title V operating permit program were also reviewed to determine permitted emissions for facilities. For Class II sources, available permits were reviewed for approval dates to identify facilities that should be included in a baseline inventory. For current scenario emissions, permitted emission rates for all stationary facilities that emit SO_2, NO_2, and PM_{10} that were in operation during 1998 and 1999 were used. After all stationary sources were accounted for and emission inventories for baseline and current scenarios were established, modeling-related source parameter data were gathered for each stationary source. The modeling parameters include emission rates for each point source, Universal Transverse Mercator (UTM) coordinates for emission points, and stationary source fencelines, building dimensions (length, width, and height) for major stationary sources, stack heights, stack diameters, stack gas exist velocities, and stack gas exit temperatures.

This revised analysis contains new data from several facilities that have modified their operations and obtained permits since the original Truckee Corridor study. Data from other facilities were updated to reflect a more accurate representation of their actual operations. Alcoa Sierra Micromills, All-Lite Aggregates, Eagle-Picher, Kal Kan, Naniwa, and Sierra Pacific Tracy generating station were facilities where the source data were updated or included as new data. The inventory for Alcoa Sierra Micromills was modified to better reflect the permitted source configuration. All-Lite was modified to provide updated emission rates and to better reflect facility operations with the source parameter inputs. Many of the sources were changed to volume sources because they are classified as process fugitives. The Eagle-Picher inventory was modified to better reflect the permitted source configuration. The Kal Kan facility was granted a permit modification to duct several of their emission point into one, and they also added another emission source. The use of building downwash specific to the new configuration of Kal Kan was also incorporated into the updated source data. Sierra Pacific's Tracy plant added a duct burner and also reduced their SO_2 emissions. At the time of the original Truckee River Corridor study, the Naniwa facility had not been issued a permit, therefore; emissions from Naniwa were not included in the original study. It has since received a permit, and the source data from Naniwa were included in this new study of the Truckee River Corridor.

Appendix D shows the stationary emission sources and parameters included in each baseline and current modeling scenario in the revised study of the Truckee River Corridor.

3.2.2 Nevada Division of Environmental Protection Bureau of Air Quality File Search

The Nevada State Legislature has authorized BAPC and BAQP jurisdiction over all counties in the State of Nevada except for Washoe and Clark Counties but maintains jurisdiction over fossil fuel fired steam generating electric plants in Washoe and Clark Counties. HAs 76 and 83 fall primarily under the jurisdiction of BAPC and BAQP. HA76 contains one major source, Nevada Cement Company. HA83 contains one major source, Tracy Generating Station. The only major stationary source within a 50 km radius of the HAs is Ft. Churchill Generating Station. HA85 and parts of HA83 are within the jurisdiction of Washoe County and are discussed in the following section.

3.2.3 Washoe County Bureau of Air Quality File Search

Tetra Tech conducted a file search at Washoe County for sources in HA85 and two sources in HA83. Ms. Charlene Albee of Washoe County assisted Tetra Tech with the file search. According to Ms. Albee, Washoe County contains only one major stationary source, R.R. Donnelley & Sons Company. This source is a major stationary source of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs), but not SO_2; therefore it is not included in the emissions inventory. The two current minor point sources in the Washoe County portion of HA83 are Granite Construction Company and Frehner Construction's Mustang Facility.

3.3 FUGITIVE SOURCE INVENTORY

Fugitive sources in HA76, HA83, and HA85 were assigned to one of three categories: railroad, vehicle, and miscellaneous sources. Railroad emissions were apportioned into 1-km by 1-km grid cells based on the proportion of county railroad miles in the HAs and the total railroad miles traveled annually. Vehicle emissions were apportioned into the same grid cells based on the proportion of road miles in each grid cell and the total vehicle miles traveled annually in each grid cell. Miscellaneous fugitive emissions were distributed into the grid cells according to population density. Emissions from railroads, vehicles, and miscellaneous sources were then totaled to give a single emission rate for each 1-km by 1-km grid cell. The following sections explain the calculations of fugitive source emissions in more detail.

3.3.1 Railroad Source Analysis

Tetra Tech used a two-step process to calculate railroad emissions for each grid cell of HA76 and HA83. Because there are no railroad tracks in HA85, rail emissions were not calculated for grid cells in this HA. The first step was to calculate emissions in the fraction of each county that make up HA76 and HA83. Each HA encompasses portions of several different counties. It is important to identify the counties through which railroads pass in HA76 and HA83 because the emissions data available from the NET Tier database are organized by county. Railroad tracks in HA76 span portions of Churchill, Lyon, and Washoe counties, and railroad tracks in HA83 are found in Lyon, Storey, and Washoe counties. The second step was to break down the emissions from the portion of each county that makes up HA76 and HA83 even further by apportioning the emissions into 1-km by 1-km grid cells.

To accomplish the first step and calculate emissions in the fraction of each county that makes up HA76 and HA83 ($RE_{countyfraction}$), Tetra Tech determined the total rail length in each county (RL_{county}), the length of railroad in the fraction of each county that makes up HA76 and HA83 ($RL_{countyfraction}$), and the total railroad emissions for each county (RE_{county}). Census data from the year 2000 was used to estimate RL_{county}. Next, $RL_{countyfraction}$ was computed for HA76 and HA83 using GIS applications. Tetra Tech downloaded RE_{county} from the NET Tier database, and data for each pollutant and baseline date were extracted. The following equation shows how $RE_{countyfraction}$ for HA76 and HA83 were calculated. The calculation was repeated for each county in HA76 and HA83.

$$RE_{countyfraction} = RE_{county} \frac{RL_{countyfraction}}{RL_{county}}$$

The second step, apportioning $RE_{countyfraction}$ into the 1-km by 1-km grid cells in HA76 and HA83 ($RE_{gridcell}$), required Tetra Tech to use $RL_{countyfraction}$, $RE_{countyfraction}$, and the rail length in each grid cell ($RL_{gridcell}$) in a calculation similar to that of the first step. $RL_{countyfraction}$, for each county area were determined for the first step, $RE_{countyfraction}$ for each county area were the results of the first calculation, and $RL_{gridcell}$ were determined using GIS applications. The equation below demonstrates how $RE_{gridcell}$ were calculated.

$$RE_{gridcell} = RE_{countyfraction} \frac{RL_{gridcell}}{RL_{countyfraction}}$$

Railroad source emissions calculations for the study area can be found in Appendix E.

3.3.2 Mobile Source Analysis

The mobile source analysis for the increment study was a four-step process, including a data collection phase and three sets of calculations. The result of this process allowed vehicle emissions for each pollutant to be apportioned into the 1-km by 1-km grid cells used in the railroad analysis.

Data on vehicle miles traveled (VMT) and countywide vehicle emissions data for each pollutant were both needed for this analysis. First, Tetra Tech acquired annual VMT for Nevada from the 1982, 1994, 1996, and 1998 Federal Highway Administration Highway Statistics publication. VMT data were divided into three road types to account for their differing contributions to mobile source emissions: interstate, highway, and arterial street. Next, countywide vehicle emissions data for each pollutant were gathered from the NET Tier database for the years 1994, 1996, and 1998. Because no emissions data were available for 1982, a trend regression analysis based on emissions from 1994, 1996, and 1998 was used to estimate pollutant emissions in 1982 for each county.

The first set of calculations broke down VMT into road miles per county, HA, and grid cell. The VMT were also broken down into the three different road types. GIS techniques were used to apportion VMT data collected for Nevada into these area and road type categories. This set of calculations resulted in numeric values for:

- Interstate VMT for each county
- Highway VMT for each county
- Arterial Street VMT for each county
- Interstate VMT for each HA
- Highway VMT for each HA
- Arterial Street VMT for each HA
- Interstate VMT for each grid cell
- Highway VMT for each grid cell
- Arterial Street VMT for each grid cell

The second set of calculations broke down countywide vehicle emissions into HA-wide emissions for each road type using ratios. The ratio of HA VMT to county VMT for each road type was multiplied by the ratio of HA VMT per road type to total HA VMT. The product of these two ratios was then multiplied by countywide emissions to give HA-wide emissions per road type (1).

$$(1)\quad \frac{TotalHAVMT}{TotalCountyVMT} * \frac{HARoadTypeVMT}{TotalHAVMT} * CountyEmissions = HARoadTypeEmissions$$

The third set of calculations resulted in the final apportionment of all vehicle emissions into the 1-km by 1-km grid cells. A ratio of grid cell VMT to HA VMT was calculated for each grid cell and road type using the numeric values from the first set of calculations. These ratios were then multiplied by the HA-wide emissions for each road type derived from the second set of calculations to yield grid cell emissions for each road type (2). The emissions values in each grid cell for interstate, highway, and arterial streets were summed to calculate the total vehicle emissions present in each grid cell (3).

$$(2)\quad \frac{GridCellInterstateVMT}{HAInterstateVMT} * HAInterstateEmissions = InterstateGridCellEmissions$$

$$\frac{GridCellHighwayVMT}{HAHighwayVMT} * HAHighwayEmissions = HighwayGridCellEmissions$$

$$\frac{GridCellArterialVMT}{HAArterialVMT} * HAArterialEmissions = ArterialGridCellEmissions$$

(3) $$\begin{array}{ll} & InterstateGridCellEmissions \\ & HighwayGridCellEmissions \\ + & \underline{ArterialStreetGridCellEmissions} \\ & TotalEmissionsForEachGridCell \end{array}$$

Mobile source emissions data tables and calculations are available in Appendix F.

3.3.3 Miscellaneous Source Analysis

The miscellaneous source analysis for the increment study was a four-step process, including one data collection initiative and two sets of calculations, and GIS techniques. The result of this process allowed miscellaneous emissions for each pollutant to be apportioned into 1-km by 1-km grid cells.

Data for population density and countywide miscellaneous emissions for each pollutant were used in this analysis. To calculate emissions from miscellaneous sources for the 1-km by 1-km grid cells, Tetra Tech first acquired countywide miscellaneous emissions data for each pollutant from the NET Tier database for the years 1994, 1996, and 1998. However, no miscellaneous emissions data were available for 1982. To determine what miscellaneous emissions might have been in 1982, a trend regression curve based on emissions from 1994, 1996, and 1998 was developed. This best fit curve allowed Tetra Tech to estimate miscellaneous emissions in 1982 for each county.

To apportion these emissions by population density, Tetra Tech collected census population data for the HAs in this study. Census data are available by county and census block. Census blocks are smaller than counties. By using census block data instead of countywide population data to determine population density, Tetra Tech was able to more closely refine population density in the study area. Census data from 1980, 1990, and 2000 were needed for this analysis.

The first set of calculations broke countywide population totals down into census block population totals for 1980 and 1990. Tetra Tech estimated the missing 1980 and 1990 census block values using countywide population data collected for 1980, 1990, and 2000. The ratio of each county's 1980 population to the corresponding 2000 county population was multiplied by the applicable 2000 census block totals. This allowed Tetra Tech to estimate the 1980 population for each census block. The same method was used to estimate totals for population in the 1990 census blocks (1).

(1) $$\frac{1980 CountyPopulation}{2000 CountyPopulation} * 2000 CensusBlockPopualtion = 1980 CensusBlockPopulation$$

$$\frac{1990 CountyPopulation}{2000 CountyPopulation} * 2000 CensusBlockPopualtion = 1990 CensusBlockPopulation$$

The second set of calculations distributed countywide miscellaneous emissions into each census block for the different study dates. Because countywide miscellaneous emissions were apportioned based on population density, a ratio of census block population to county population was needed. This ratio was then multiplied by the county emissions to give emissions apportioned to each census block (2).

(2) $$\frac{BlockPopulation}{CountyPopulation} * CountyEmissions = BlockEmissions$$

Using GIS techniques, the 1-km by 1-km grid cells were overlaid onto a map displaying population and emissions for each census block. Each grid cell was intersected with a specific census block, and the corresponding percentage of population was allocated to the grid cell. Emissions from miscellaneous sources were then distributed according to population density for each grid cell using GIS methods. Miscellaneous source emission calculations are shown in Appendix G.

4.0 AIR QUALITY MODELING

Air dispersion modeling was conducted to assess the NO_2 and PM_{10} PSD increment consumption in HA83, and the SO_2 PSD increment consumption in HA76, HA83, and HA85. The modeling study also identified portions of the planning areas where the PSD increment has been expanded since the baseline dates. The following sections discuss the model selection, model setup, and model application.

4.1 MODEL SELECTION

Several options were considered for the appropriate dispersion model for this analysis. Because there are significant terrain features in the HAs, particularly through the Truckee River Corridor, a model suited for addressing complex terrain issues was essential. The Industrial Source Complex Model (ISC3) was eliminated from consideration because it is not able to address complex terrain as well as other models considered. The enhanced Complex Terrain Dispersion Model (CTDMPLUS) has been used for complex terrain modeling in the region, but is cumbersome to run and must be used in conjunction with another model for simple terrain applications. After considering several options, a next-generation dispersion model called the AERMOD was selected for this PSD increment consumption modeling analysis. AERMOD combines the ability to address both complex terrain and simple terrain issues, and has improved dispersion algorithms for addressing boundary-layer meteorology. It is currently in the process of official EPA approval for regulatory analysis, and is now being used in several states for compliance modeling.

AERMOD is a Gaussian plume dispersion model that is based on planetary boundary layer principles for characterizing atmospheric stability. The model evaluates the non-Gaussian vertical behavior of plumes during convective conditions with the probability density function and the superposition of several Gaussian plumes (Federal Register 2000). AERMOD is a modeling system with three components; AERMAP is the terrain preprocessor program, AERMET is the meteorological data preprocessor, and AERMOD includes the dispersion modeling algorithms.

AERMOD was developed to handle simple and complex terrain issues using improved algorithms. As with CTDMPLUS, AERMOD uses the dividing streamline concept to address plume interactions with elevated terrain. However, AERMOD is less cumbersome to use than CTDMPLUS.

On April 21, 2000 the EPA proposed revising the *Guideline On Air Quality Models* (40 CFR, Part 51, Appendix W) to replace the ISC3 model with AERMOD as the preferred model for many air quality impact assessments including complex terrain applications. EPA's proposal came after the results of model evaluation studies indicated that AERMOD performs better than ISC3, and also as well or better than CTDMPLUS in complex terrain applications. AERMOD will replace ISC3 as the preferred state-of-the-practice dispersion model for evaluating potential impacts from industrial sources within a 50 km radius of the source.

After concluding that AERMOD was the model best suited for use in this PSD increment consumption study, BAPC and BAQP sought approval for its use from EPA Region 9. After reviewing the goals of the project and the changing EPA guidance on the application of dispersion models, EPA Region 9 approved the use of AERMOD for this study.

Use of AERMOD for the study has two distinct advantages. The first advantage is that AERMOD uses improved model algorithms that more closely simulate plume dispersion in the atmosphere than many other models; and the second advantage is that modeling data developed for this study will not become outdated when AERMOD is officially recognized as the standard model for PSD increment applications.

4.2 MODELING METHODOLOGY

The dispersion modeling analysis was performed to estimate the PSD increment consumed or expanded from industrial and other pollutant emission sources in the three planning areas. Modeling was performed to evaluate incremental impacts of NO_2, SO_2, and PM_{10}, as triggered in the separate HAs, for all applicable averaging periods. The applicable averaging periods and associated PSD increments addressed in this study are shown in Table 4-1.

Separate model runs were executed for each of the planning areas; for each facility; for each PSD increment triggered pollutant; for both the baseline year and the current year emission inventories; for short-term and long-term averaging periods as applicable; and for each year of meteorological data processed for the study. More than 200 model runs were completed for this study. These model runs were based on emissions of PSD triggered pollutants described in Section 3.0. Emissions from all sources that were operating as of each baseline date were included in the baseline year modeling runs. Emissions from all applicable sources operating as of the study years 1998 and 1999, and source data that were amended with 2002 data for certain facilities in HA83, were modeled in the current year modeling runs. Output files from these two sets of modeling were post-processed to subtract baseline year impacts from current year impacts, resulting in PSD increment consumption. Using this methodology provides output that can account for PSD increment expansion as well as increment consumption.

Because meteorological data was not available for the minor source baseline period for HA76, a paired-in-time/paired-in-space approach was used for post-processing to determine increment values. Pairing in time means that results generated for every modeled averaging period using the baseline meteorological year are subtracted from the current results generated for the same averaging period modeled using the current year meteorological data. A paired-in-space analysis compares results on a receptor-by-receptor basis by subtracting baseline results at a receptor from current results at the same receptor.

TABLE 4-1

PREVENTION OF SIGNIFICANT DETERIORATION INCREMENTS

Averaging Period	Prevention of Significant Deterioration Increment (µg/m^3)		
	NO_2	**SO_2**	**PM_{10}**
3-Hour	N/A	512	N/A
24-Hour	N/A	91	30
Annual	25	20	17

Notes:

N/A Not applicable
µg/m^3 micrograms per cubic meter

The HA76 analysis was completed using the paired-in-time/paired-in-space method of determining increment consumption because the baseline trigger date for SO_2 in HA76 occurred in 1982, and there was no complete meteorological data set representative of the Tracy site for the year prior to the baseline year. Because there were no reliable baseline meteorological data, the baseline and current modeling analyses were completed using the current meteorological data sets from 2000 and 2001. Since baseline meteorological data was not available, the paired-in-time/paired-in-space methodology was the most appropriate approach for determining increment impacts in HA76.

When conducting a paired-in-time/paired-in-space analysis for 3-hour SO_2 increments, the baseline and current model runs generate impacts for each 3-hour period in the year of meteorological data used in the modeling. Both the baseline and current runs generate impact results for eight identical 3-hour periods per day for 365 days per year. The results from all the 3-hour periods are paired according to the date and time when they occurred, which makes the analysis paired-in-time. Each baseline result is subtracted from the matching paired-in-time current result. This analysis occurs for each set of results associated with every individual receptor, which also makes the analysis paired-in-space. After the paired-in-time/paired-in-space calculations are complete, there are 2920 (8760 hours/year ÷ 3 hour blocks) 3-hour increment results for each receptor for a year that is not a leap year, such as 2001. There would be 8 additional 3-hour increment results, 2928, for each receptor for a leap year such as 2000. The second highest increment result for each receptor is selected to represent increment consumption at that receptor. The original Truckee River Corridor study submitted to NDEP in early 2002 was completed using a paired-in-time/paired-in-space analysis.

An unpaired-in-time/paired-in-space methodology was used to determine increment values for HA83 and HA85. The unpaired-in-time/paired-in-space analysis eliminates emphasis on specific time-bound increment results while maintaining the spatial component of the increment analysis. Using the SO_2 example above, this methodology consists of determining baseline and current impact results for a 3-hour time period at every receptor. The second highest modeled impact at each receptor is determined from the baseline results, and the second highest modeled impact at each receptor from the current results is also selected. Therefore, there is one baseline scenario result and one current scenario result associated with each receptor. The second high baseline impacts at each receptor may or may not occur at the same time of the year as the second high current impacts. The second high baseline results are subtracted from the second high current results on a receptor-by-receptor basis, which gives unpaired-in-time/paired-in-space increment results.

The minor source baseline trigger dates were in 1994 and 1996 for HA 83 and HA 85, respectively. Meteorological data were available at Sierra Pacific's Tracy facility for the years prior to both baseline dates, 1993 and 1995. Baseline models for HA83 were run using 1993 meteorological data, and HA85 baseline runs were completed using 1995 data. Because actual baseline meteorological data was available for the HA83 and HA85 studies, the unpaired-in-time/paired-in-space methodology was chosen for these increment analyses.

When conducting modeling for increment tracking, all PSD increment consuming and expanding emissions located in the specified planning area were included in the analysis. In addition, all PSD increment consuming and expanding emissions from major stationary sources within 50 km of the HAs were included in the analysis.

4.3 MODEL SETUP AND APPLICATION

The AERMOD model contains three modules: two pre-processors and the dispersion model. Model receptors are developed with the AERMAP pre-processor, meteorological data are developed with the AERMET pre-processor, and the model algorithms are applied with AERMOD.

For the original Truckee River Corridor study, Tetra Tech downloaded the appropriate AERMOD, AERMAP, and AERMET model code files from the EPA website. The code was then compiled using Lahey FORTRAN 90 (LF90), which was the same program used by EPA to compile the code. The EPA website also had AERMOD executable files available, but because array sizes in the FORTRAN code needed to be increased to handle the large number of sources and receptors, Tetra Tech recompiled the FORTRAN code. Tetra Tech used LF90 to compile AERMOD, AERMAP, AERMET, and the post processor programs. However, the LF90 version Tetra Tech purchased from Lahey contained errors that caused model results from the AERMOD analysis to differ from the model results produced by the EPA executable AERMOD program. After this problem was discovered, Tetra Tech acquired a new version of LF90 that did not contain errors and recompiled all the executables for the current Truckee River Corridor study. Extensive testing of these new executables confirmed that model results were identical to these produced using the EPA version. The new versions of the AERMOD, AERMAP, AERMET, and the post processor executables were used in this study.

Applications of AERMOD, AERMAP, and AERMET are discussed in the following sections.

4.3.1 AERMAP

The terrain preprocessor AERMAP was used to extract receptor elevation data from USGS Digital Elevation Model (DEM) files for use as input to AERMOD. DEM data files were downloaded from the USGS Internet site in 7.5-minute resolution (1-degree resolution is also available). The specific data files selected covered the complete geographic study areas. Receptor locations for the study area were based on North American Datum of 1983 (NAD 83); however, because the DEM data available through the USGS are based on North American Datum of 1927 (NAD 27), Tetra Tech converted DEM files to NAD 83 using GIS techniques to be compatible with the receptor locations for the study area. After the conversion, DEM files were processed using a utility program to add delimiters to records in the uncompressed files (as described in the AERMAP user's guide).

A runstream file for AERMAP was created in accordance with the structure and syntax rules of the program. The selected DEM files and the receptor grids were external inputs referenced in the AERMAP runstream file. Initial attempts to run the AERMAP program failed, generating errors related to lack of adjacent DEM files. Replacement of the NAD 83 DEM files with the original files downloaded from the USGS site based on NAD 27 removed these errors. Tetra Tech deduced that projecting the receptor locations into NAD 27 would likely offer a solution to the problem of mismatched datum. The receptor location data were therefore converted to coordinates based on NAD 27 for use in the program; following processing, the receptor coordinates were converted back to NAD 83. Other errors received during initial attempts to run AERMAP were related to selection of the appropriate DEM files for the study area domain coordinates. These errors were corrected by including all DEM files within geographic coverage of the selected domain coordinates, including those that did not necessarily overlap receptor locations. Upon successful completion of the program, AERMAP generated a text output file containing a receptor elevation for each receptor coordinate in the receptor grid files. In addition, AERMAP generated a height scale for each receptor. A height scale is a measure of the height and distance of the local terrain feature that has the greatest influence on dispersion for that receptor.

Separate dispersion model receptor grids were generated with the AERMAP software for HA76, HA83, and HA85. The receptor grids covered the entire area of each HA, with individual receptors located 500 meters apart. Additional model receptors were identified surrounding large industrial sources where high pollutant concentrations were expected so that maximum concentrations would be identified. These additional receptors extend 3-km from each stationary source with 100-meter receptor spacing up to 1 km from the sources, and 250-meter receptor spacing from 1 to 3 km from large sources. Receptors located inside stationary source fencelines were not eliminated from the initial modeling analysis. Model results at receptors inside property fencelines may not represent accurate modeled increment consumption values because an emission source does not consume PSD increment within its own fenceline. In cases where exceedences were initially predicted inside fencelines, the results were put through refined post-processing to eliminate impact contributions by the sources whose boundary the receptors were located within.

4.3.2 AERMET

The meteorological data pre-processor AERMET was used to develop meteorological input data for the AERMOD modeling analysis. The AERMET software processes surface meteorological data and twice-daily upper air sounding data into the proper format using a three-stage process. The first stage extracts the data and administers several data quality checks. The second stage merges the data, and the third stage estimates required boundary layer parameters and writes the data in a format readable by AERMOD.

Meteorological data collected from Sierra Pacific Power Company's Tracy Generating Station (Tracy) during 2000 and 2001 were used for this modeling analysis. These two years of data were processed into model-ready format using AERMET. An additional surface dataset collected from the National Weather Service (NWS) station in Reno was used as input to AERMET. This dataset was used to substitute for any missing values from the Tracy data, and to provide additional information for AERMET processing. The final surface data requirement included estimates of the albedo of the ground, Bowen ratio, and surface roughness. These input values were estimated using guidance in the *User's Guide for the AERMOD Meteorological Preprocessor (AERMET)*. The last input data requirement for AERMET is twice-daily upper air sounding data. Sounding data were obtained from the National Climatic Data Center (NCDC), and include upper air soundings from Reno, Nevada for the years 2000 and 2001.

<u>On-Site Surface Data</u>

The Tracy meteorological tower collects many atmospheric variables. Most of the collected data were used in AERMET processing, including wind speed and wind direction at three levels (10, 55, and 100 meters), barometric pressure, temperature, relative humidity, standard deviation of horizontal wind direction at all three levels, and standard deviation of vertical wind speed at all three levels. Use of data at three wind levels provides a better estimate of boundary layer conditions.

NWS Surface Data

AERMET is designed to extract NWS surface data from several different formats including CD-144, SCRAM, and SAMSON. NCDC's standard data storage format has been CD-144 format for many years. However, NCDC no longer uses this format and any newer data is stored in TD-3280 format, which is not easily converted to a format usable by AERMET. Since the 2000-2001 NWS Reno data were stored in the new format, they had to be converted to CD-144 format. In addition, the Reno data did not include values opaque cloud cover. Because AERMET uses these values, they had to be estimated from other variables collected for each hour, including total cloud cover and present weather. After NWS surface data were converted to CD-144 format, they were extracted, quality checked, and merged with quality checked on-site data.

NWS Upper Air Data

Reno, Nevada upper air sounding data for 2000 and 2001 were obtained in TD-6201 format. These data were extracted by AERMET, quality checked, and merged with the two surface datasets.

After all three datasets were merged, the final processing stage was executed to produce the model ready data. This final stage calculates boundary layer parameters that are subsequently used by AERMOD. The final processing stage was completed with modified AERMET software that corrected problems that occurred when missing data were encountered in the upper air soundings.

4.3.3 AERMOD

AERMOD was run using the regulatory default mode. Emission sources, model receptors, and meteorological data were contained in separate files and opened during model execution. Output from the model was stored in binary files and used for post-processing. See Section 4.5 for a discussion of post-processing techniques.

4.4 EMISSION SOURCE CHARACTERIZATION

A PSD increment emission inventory was developed for each applicable pollutant for input into AERMOD (see section 3). Emission source data collected by Tetra Tech were used to establish an emission inventory that details emissions and source parameters for the following:

- SO_2 and PM_{10} emissions and source parameters for major stationary sources that existed on the major source baseline date of January 6, 1975

- NO_2 emissions and source parameters for major stationary sources that existed on the major source baseline date of February 8, 1988

- Emissions and source parameters for SO_2 emissions from stationary, area, and mobile sources that existed on:

  - The HA76 SO_2 minor source baseline date of October 26, 1982
  - The HA83 SO_2 minor source baseline date of March 11, 1994
  - The HA85 SO_2 minor source baseline date of January 9, 1996

- Emissions and source parameters for NO_2 emissions from stationary, area, and mobile sources that existed on:

  - The HA83 NO_2 minor source baseline date of March 11, 1994

- Emissions and source parameters for PM_{10} emissions from stationary, area, and mobile sources that existed on:

  - The HA83 PM_{10} minor source baseline date of March 11, 1994

Dispersion modeling was conducted using emission inventories based on the above baseline dates to identify increment consuming and expanding sources.

The emission inventories represent allowable emissions for the current inventory and, where possible, actual emissions for the baseline inventories. Because historical records for sources dating back to the baseline years do not always contain the required information for determining actual emissions, allowable emissions were used where actual emissions are not available or cannot be reliably estimated. Sources that are either partially or fully represented with allowable emissions instead of actual emissions are:

- Sierra Pacific – Tracy
- Gopher Construction
- Eagle-Picher Minerals Inc.
- All-Lite Aggregate
- CR Minerals Corporation
- Rilite Aggregate

The emission inventories were constructed for the modeling study with three basic types of emission sources: industrial sources; mobile sources such as on-road vehicles and locomotives; and county-wide emission sources representing all other emissions that cannot be individually quantified. The following subsections detail how these emission types were characterized in the dispersion modeling analysis.

4.4.1 Industrial Sources

Industrial sources were input to the model using source parameters and emission data obtained during Tetra Tech's data collection activities. Current emissions were based on the most recent available data on a source's permitted allowable emissions. Most of this information came from NDEP's Paradox database, which keeps track of current permitted emissions and source parameters. The date of emissions information used in the analysis was documented for each stationary source.
Baseline emission source data represent stationary source operations as of a given baseline date, and were based on available records from the closest date prior to the baseline date. In other words, Tetra Tech used emission data as near to the baseline date as possible where records exist, but before the baseline trigger date. In some cases, the only recorded emission data are two to three years prior to a given baseline date.

Generally, industrial sources were modeled using AERMOD's point source algorithms. Stack-type emissions from the industrial facilities were modeled as point sources using stack parameters obtained during data collection activities. In some cases, stack parameters are different between the baseline year and the current year. In these cases, the modeling took into account the changes in stack parameters (provided both sets of stack parameters were reliable) to more accurately reflect the impact the changes had on the increment. Following guidance from NDEP, some process fugitive emission units were modeled as point sources and were assigned a 10 meter stack height, ambient temperature, 0.01 meters per second exit velocity, and 1.0 meter stack diameter, which represents an average equivalent diameter for these types of sources. However, process fugitive emission units (such as conveyor transfer points) at the All-Lite and Eagle Picher facilities were modeled as volume sources.

Some sources are limited to fewer than 24 daily operation hours and it is impossible to know which hours a source will operate. Therefore, each source in the inventory that is limited to less than 24 operation hours per day was carefully evaluated. It was determined that these sources have an insignificant impact on PSD increment consumption due to their low emission rates. As a result, these sources were simulated in the model as if they operated 24-hours per day in order to simplify the model input. The only exception to this is the updated Eagle-Picher model input data. Specific hours of operation data were provided by NDEP and subsequently incorporated into the modeling.

AERMOD currently uses the same direction-specific building downwash algorithms used by the ISC3 model. Because of the overall large number of sources in the modeling analysis, it was considered prohibitive to include building downwash for all sources in this study, although it is NDEP policy to include building downwash in dispersion modeling analyses. Due to the potential relative importance of impacts from major sources, building downwash parameters were included for major sources in the modeling for HA76, 83, and 85. Building downwash parameters obtained for major sources during data collection activities were input to AERMOD to calculate building downwash effects.

4.4.2 Mobile Sources

Countywide vehicle mobile source emissions for each of the years representing the minor source baseline dates of interest were input to the model to evaluate the incremental difference in vehicle impacts since the applicable PSD baseline dates. Mobile source emissions were apportioned into 1-km by 1-km grid cells across the respective HAs. The countywide emissions from NET were apportioned into the separate appropriate grid cells by the ratio of known length of roads in the county to the known length of road in each grid cell, and by the VMT data available from the U.S Department of Transportation (DOT). The EPA State Implementation Plan guidance was used as a technical reference for these analyses. The SIP guidance provides selection of road mileage distribution for emission apportionment as an option, which is consistent with this analysis.

The estimated emissions of SO_2, PM_{10}, and NO_2 from vehicle mobile sources that are apportioned to each 1-km grid cell were added to the total fugitive emissions from that grid cell. The total fugitive emissions of each pollutant from that grid cell were modeled as area sources using AERMOD for separate predicted SO_2, PM_{10}, and NO_2 increment impacts.

4.4.3 Fugitive Sources

Fugitive emissions from the EPA NET database were distributed on a county-by-county basis within the 1-km grid cells for use in AERMOD. As with the mobile source inventory, the established EPA SIP guidance was used as a technical reference. The SIP guidance for rural/small urban emission allocation was used as a protocol to distribute the NET emission data based on population in the HAs. For example, assume one study area that is exactly 25 percent (%) of the county size, and contains 50% of the county's population. Also, assume that population data are organized in exactly the same shape as the study area. Tetra Tech reviewed the population of the study area in relation to the population of the entire county. The emission data allocated to the study area were the same percentage as the population of the study area compared to the population of the entire county, in this example, 50%. These data were then distributed to the grid cells for modeling purposes accordingly so the sum of the emission data for each grid cell in the study area will equal 50% of the county's total emissions, even though the study area only represents 25% of the county's area.

Each 1-km by 1-km area source used in the modeling was assigned an elevation equal to the average elevation within the grid cell. This approach has been used for fugitive sources in similar studies (SW Colorado Increment consumption study), and is supported by EPA (EPA 2001). Because there are many area sources within each HA, and area sources require considerable processing time for the dispersion model, area sources were excluded from the modeling analysis if they were determined to have an insignificant impact on air quality. For purposes of this study, an area source was estimated to have an insignificant impact if its emissions would contribute less than or equal to $^1/_{100}$ of the applicable PSD increment limit for 24-hour PM_{10}. A source's significance was estimated based on its total emissions and from test model runs. Area sources with a total emission rate less than or equal to 6.5E-9 grams per second per square meter (g/s-m^2) were estimated to have an insignificant impact based on model test runs.

4.5 POST-PROCESSING

Model output files from AERMOD were combined in a post-processing step to determine PSD increment consumption. Pollutant impacts from baseline sources were subtracted from pollutant impacts from current sources on a receptor-by-receptor basis, with the difference resulting in PSD increment consumption. In some cases, the baseline impacts were greater than current impacts. This scenario resulted in PSD increment expansion at those receptors.

To accomplish both the unpaired-in-time and paired-in-time analyses, a FORTRAN executable program that was written in Lahey FORTRAN 90 was used to post-process the baseline and current modeling results. The name of the program is GETINCSS. The code for the program is contained in Appendix H.

GETINCSS reads several unformatted impact files produced by the baseline or current AERMOD runs and one file for the corresponding receptor set. Each unformatted impact file must contain predicted concentrations for a single averaging period. GETINCSS is designed to work with input files that contain predicted impacts for one year of meteorological data at every receptor for a single averaging period. The averaging periods may range from 1 hour to 24 hours or the modeling period, which is typically 1 year. Averaging periods between 24 hours and the modeling period will not work with the post-processor. The receptor file used for post processing is identical to the AERMOD modeling receptor file. It is critical that the receptor file used is the exact same file used in the AERMOD modeling so that predicted impacts and can be properly paired on a receptor-by receptor basis.

For the unpaired-in-time analysis, baseline and current impacts are processed separately. GETINCSS combines the predicted baseline-year or current-year impacts into a file that contains a predicted impact value at each receptor by adding the impacts from the baseline or current unformatted files together. The program writes the total current or baseline impacts in a space delimited text format on a receptor-by-receptor basis.

The results from the current and baseline impacts post-processing are then compared in an Excel spreadsheet to determine increment consumption and expansion on a receptor-by-receptor basis. Baseline impacts are subtracted from current impacts, and this occurs regardless of when the baseline or current impact for each receptor occurred in time.

For the paired-in-time analysis, GETINCSS can be used to process both baseline and current impact files at the same time. The output created by the program contains paired-in-time increment values. GETINCSS reads several input data files, including files representing the baseline-year and current-year predicted impacts, and one for the corresponding receptor set. These impact files are combined into predicted increment values at each receptor.

GETINCSS combines the predicted baseline-year and current-year impacts into a predicted increment value at each receptor by subtracting the baseline-year impact from the current-year impact. The calculations are performed for each averaging period during the modeled meteorological year. Then, the program selects the highest increment value observed at each receptor and writes these results to an output file.

GETINCSS uses a general input file with a predefined format called *getincss.inp*. The program creates an output file called *incrment.dat*. Two examples of the predefined input file format that allows the user to get the predicted increment value is shown and described below. The first example is for an unpaired-in-time analysis, and the second is for a paired-in-time analysis.

<u>Example 1: GETINCSS input files (getincss.inp) for an Unpaired-in-Time Analysis</u> – Baseline and current impacts are processed separately.

Baseline:

```
24
ALNO00BA.AN 1.0
ARNO00BA.AN 1.0
FRNO00BA.AN 1.0
GRNO00BA.AN 1.0
NCNO00BA.AN 1.0
NTNO00BA.AN 1.0
RANO00BA.AN 1.0
SPNO00BA.AN 1.0
366
```

Current:

```
24
ACNO00CU.AN 1.0
ALNO00CU.AN 1.0
ARNO00CU.AN 1.0
BPNO00CU.AN 1.0
EPNO00CU.AN 1.0
FRNO00CU.AN 1.0
GONO00CU.AN 1.0
GRNO00CU.AN 1.0
KKNO00CU.AN 1.0
NANO00CU.AN 1.0
NCNO00CU.AN 1.0
NTNO00CU.AN 1.0
QPNO00CU.AN 1.0
RFNO00CU.AN 1.0
SPNO00CU.AN 1.0
TRNO00CU.AN 1.0
366
```

<u>Example 2: GETINCSS input file (getincss.inp) for a Paired-in-Time Analysis</u> – Baseline and current impacts are processed together.

```
24
ALNO00BA.AN -1.0
ARNO00BA.AN -1.0
FRNO00BA.AN -1.0
GRNO00BA.AN -1.0
NCNO00BA.AN -1.0
NTNO00BA.AN -1.0
RANO00BA.AN -1.0
SPNO00BA.AN -1.0
ACNO00CU.AN 1.0
ALNO00CU.AN 1.0
ARNO00CU.AN 1.0
BPNO00CU.AN 1.0
EPNO00CU.AN 1.0
FRNO00CU.AN 1.0
GONO00CU.AN 1.0
GRNO00CU.AN 1.0
KKNO00CU.AN 1.0
NANO00CU.AN 1.0
NCNO00CU.AN 1.0
NTNO00CU.AN 1.0
QPNO00CU.AN 1.0
RFNO00CU.AN 1.0
SPNO00CU.AN 1.0
TRNO00CU.AN 1.0
366
```

The first line on the input files describes how many unformatted impact files will be used in the post processing. Tetra Tech modeled each facility separately, so the post processing input files includes the number of facilities evaluated for each baseline and current analysis for each pollutant and averaging period. The next section of the input file lists the names of the files to be included in the post processing routine. A multiplier of 1.0 is applied to the baseline files in the unpaired-in-time analysis because the impacts need to be added together and not subtracted for this analysis. A multiplier of -1.0 is applied to the baseline files in the paired-in-time analysis, and a multiplier of 1.0 is applied to the current files. The baseline multiplier tells GETINCSS to subtract the baseline impacts from the total increment, and the current multiplier tells the program to add the current impacts to the total increment. The multipliers are listed after each file name. The last line of the input file tells the program how many meteorological days are being post processed. This feature was added so that post processing could be performed on impacts determined using leap year meteorological data files. To run GETINCSS, follow the steps below:

- Create a folder in which the post processing can be accomplished.
- Make sure this folder contains a copy of GETINCSS, the input file named *getincss.inp*, and the AERMOD receptor file used to model baseline and current impacts.
- Copy or rename the AERMOD receptor file to *receptor.dat*
- Copy or move all the unformatted impact files being used in the post processing into the folder.
- Create the *getincss.inp* input file for the first processing routine.
- Make sure all the unformatted impact files to be incorporated into the post processing are both listed in the *getincss.inp* input file and present in the folder in which the post processing will take place.
- Open a DOS prompt and go to the directory in which all the post processing files are located.
- Type the name of the post processor, GETINCSS, and hit enter. The post processor will read the input file, and the *increment.dat* increment file will be produced in the folder with the other files.
- Rename the GETINCSS output file, *incrment.dat*, with identifying characters (see the recommended naming convention in the text below)

It is recommended that the *incrment.dat* output file from GETINCSS be renamed using the following nomenclature for the unpaired-in-time analysis:

PPMMHHXX.AA

Where:

PP = Two characters representing the pollutant modeled, such as SO for SO_2, PM for PM_{10}, and NO for NO_x

MM = Two characters representing the year of the meteorological data used, such as 00 for 2000.

HH = Two characters representing the averaging period of the modeling, such as 24 for 24-hour, 03 for 3-hour and AN for annual

XX= Two characters that read either 'CU' which stands for current or 'BA' for baseline

AA = Two characters representing the air quality control region, such as 76 for HA76, 83 for HA83, or 85 for HA85

For the paired-in-time analysis, it is recommended that the *incrment.dat* output file from GETINCSS be renamed using the following nomenclature:

AAPPMMIN.HH

Where:

AA = Two characters representing the air quality control region, such as 76 for HA76, 83 for HA83, or 85 for HA85

PP = Two characters representing the pollutant modeled, such as SO for SO_2, PM for PM_{10}, and NO for NO_x

MM = Two characters representing the year of the meteorological data used, such as 00 for 2000.

IN = Two characters that read 'IN' which stands for increment results

HH = Two characters representing the averaging period of the modeling, such as 24 for 24-hour, 03 for 3-hour and AN for annual

4.6 PSD INCREMENT CONSUMPTION RESULTS

There were no SO_2 PSD increment exceedences predicted in HA76, HA83, or HA85. Additionally, there were no annual PM_{10} PSD increment exceedences predicted in HA83. There were numerous annual NO_2 and 24-hour PM_{10} PSD exceedences predicted in HA83. The following sections give modeling results for each HA in the study. Modeling files for NO_2, SO_2 and PM_{10} can be found in Appendix I.

4.6.1 HA76

HA76 was modeled for SO_2 impacts using the protocol described in Section 4.2 through Section 4.5. The modeling showed no predicted exceedences of the 3-hour, 24-hour, or annual SO_2 increment in HA76. Figures 4-1a through 4-3b (Appendix C) show the distribution of 3-hour and 24-hour high, second-high and annual SO_2 increments in HA76 for 2000 and 2001 meteorological data. The increment values pointed out on the maps represent the highest increment values in ambient air, which is outside any facility fenceline. Table 4-2 presents the highest second-high predicted 3-hour and 24-hour impacts and maximum annual impacts for modeling with the 2000 and the 2001 meteorological data.

As can be seen in Figures 4-1a, 4-1b, 4-2a, and 4-2b (Appendix C), the maximum predicted 3-hour and 24-hour SO_2 PSD impacts are just a small fraction of the allowable increment.

The modeling results for annual SO_2 increment reflected in Figure 4-3a and 4-3b (Appendix C) show many increment impacts below 0 $\mu g/m^3$ (negative values) across the planning area, which is far less than the allowable annual PSD increment of 20 $\mu g/m^3$ and indicates increment expansion. The low annual SO_2 increment impacts across HA76 are due to the relative lack of SO_2 increment consuming point sources in conjunction with the low difference between annual SO_2 emissions for current vehicle traffic associated with the highways, as compared to SO_2 emissions from these sources in the baseline year of 1982. The annual SO_2 PSD impacts show large areas of the basin with slight increment expansion. The highest predicted annual SO_2 increment consumption was 4.55 $\mu g/m^3$.

4.6.2 HA83

The modeling protocol described in Section 4.2 through Section 4.5 was used to model SO_2, PM_{10}, and NO_2 PSD increment impacts in HA83. No exceedences of the 3-hour, 24-hour, or annual SO_2, or the annual PM_{10} PSD increment were predicted using this protocol. However, there were PSD modeled increment violations of annual NO_2 and 24-hour PM_{10} in HA83. The PSD increment consumption modeling results for HA83 are presented in Table 4-3 and explained further in the remainder of this section.

SO_2

The SO_2 modeling predicted no SO_2 PSD increment exceedences in HA83. Table 4-3 reflects increment values given by the modeling and post processing. Figures 4-4a through 4-6b (Appendix C) show the distribution of predicted 3-hour, 24-hour and annual SO_2 impacts, respectively, in HA83.

TABLE 4-2

HA76 **SO_2** PSD INCREMENT CONSUMPTION

Averaging Period	2000 Modeled SO_2 Increment Consumption ($\mu g/m^3$)	2001 Modeled SO_2 Increment Consumption ($\mu g/m^3$)	SO_2 Increment Limit ($\mu g/m^3$)
3-Hour[1]	22.41	20.75	512
24-Hour[1]	5.98	6.27	91
Annual[2]	0.40	4.55	20

Notes:

1 High Second-High
2 Maximum

TABLE 4-3

HA83 **SO_2, PM_{10}, AND NO_2** PSD INCREMENT CONSUMPTION

Pollutant	Averaging Period	2000 Modeled Increment Consumption ($\mu g/m^3$)	2001 Modeled Increment Consumption ($\mu g/m^3$)	PSD Increment Limit ($\mu g/m^3$)
SO_2	3-Hour[1]	82.32	-1.79	512
	24-Hour[1]	14.02	41.51	91
	Annual[2]	0.01	0.02	20
PM_{10}	24-Hour[1,3]	58.27	51.51	30
	Annual[2]	16.73	15.26	17
NO_2	Annual[2]	34.08[3]	23.71[4]	25

Notes:

1 High Second-High
2 Maximum
3 Modeled increment values represent highest concentrations in ambient air
3 NO_2 results are based on a conversion of $(0.75)NO_x = NO_2$

Increment consumption values on the maps represent the highest increment values predicted in "ambient air" for annual SO_2 increment modeling and high second-high values for 3-hour and 24-hour SO_2 increment modeling. "Ambient air" is defined as property that is outside any facility fenceline to which the public has access. Figures 4-4a, 4-4b, 4-5a, and 4-5b (Appendix C) reflect results for 3-hour and 24-hour SO_2 PSD increment consumption for 2000 and 2001. These maps show that increment consumption across HA83 was well below the respective increment limits. The highest 3-hour and 24-hour increment consumption results occur due east of the Naniwa facility, with Naniwa sources contributing the vast majority of the total SO_2 increment consumption.

As shown in Figure 4-6a and 4-6b (Appendix C), annual SO_2 increment impacts in HA 83 result in increment expansion across most of the planning area, with the exception of a portion near the Eagle Picher facility. The general expansion of annual SO_2 increment across HA 83 is due to the reduction in SO_2 emissions for current vehicle traffic associated with the highways, as compared to SO_2 emissions from these sources in the baseline year of 1994. In addition, SO_2 increment expansion has taken place due to SO_2 reductions from the Tracy Generating Station. The highest PSD increment consumption outside a facility fenceline occurs northeast of the Eagle Picher facility. The maximum annual SO_2 increment consumption outside facility fencelines was 0.41 $\mu g/m^3$.

NO_2

Figures 4-7a and 4-7b (Appendix C) show the distribution of annual NO_2 increment impacts in HA83 for the 2000 and 2001 modeling, respectively. These figures show that most of the HA83 annual NO_2 PSD impacts are significantly less than the allowable increment. However, there are several PSD increment exceedences in HA83 for the 2000 model year. There were no increment exceedences in the 2001 modeling. The highest NO_2 PSD increment consumption for HA83 occurs in the north-central portion of the basin north of Tracy near the highway and is due to railroad/vehicle/miscellaneous fugitive emissions. The maximum annual NO_2 PSD increment consumption value modeled in HA83 is 34.1 $\mu g/m^3$. Table 4-4 shows a breakdown of the 137 predicted NO_2 exceedences using 2000 meteorological data. This breakdown indicates whether the NO_2 increment consumption at each receptor location is due to area source or point source contributions.

All the NO_2 exceedences are caused by area sources. Tetra Tech used 100% of the NO_2 area source emissions for this study. However, there are several studies that indicate Gaussian plume models over predict modeled concentrations due to low-level fugitive emissions, and there are several that recommend that a scaling factor be applied to fugitive emissions estimated for modeling. One EPA study recommends that only 25% of fugitive dust emissions be used for particulate modeling, but this study does not mention applying it to other pollutants such as NO_2 modeling. The Texas Commission on Environmental Quality (TCEQ) conducted another study on low-level fugitive emissions. This study appears to apply to all pollutants modeled as low-level fugitive values. An interoffice TCEQ memorandum, titled *Modeling Adjustment Factor for Fugitive Emissions* (TCEQ 2002), describes a modeling adjustment factor of 0.6 (60%) developed for fugitive emissions. TCEQ applies this factor to low-level fugitive releases in two ways: (1) the 0.6 factor to the emission rates is applied before input into the model, or (2) the modeled concentrations are multiplied by 0.6 to achieve final results for fugitive modeling. As a test, Tetra Tech post processed the NO_2 results using the TCEQ factor of 0.6 for the area source emissions. This methodology decreased the number of predicted NO_2 exceedences modeled using 2000 meteorological data from 137 to zero. Table 4-5 compares a select group of model results from the study using 100% of the area source emissions and the study using 60% of the area source emissions.

TABLE 4-4
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2000

Pollutant	UTM East (meters)	UTM North (meters)	Modeled PSD Increment Consumption (μg/m^3)	Averaging Period	Source Group	Rank	Current Area Sources (μg/m^3)	Current Point Sources (μg/m^3)	Baseline Area Sources (μg/m^3)	Baseline Point Sources (μg/m^3)	Primary Contributor	Primary Contribution (μg/m^3)
NO_2	283100	4382400	34.08	Annual	All	1st	276.29	1.24	229.19	2.89	Area	47.10
NO_2	287000	4382000	32.40	Annual	All	1st	156.35	11.63	116.55	8.23	Area	39.80
NO_2	283000	4382400	32.35	Annual	All	1st	276.07	1.22	228.65	5.51	Area	47.42
NO_2	283200	4381900	32.33	Annual	All	1st	191.41	1.87	145.49	4.68	Area	45.92
NO_2	283200	4382000	31.88	Annual	All	1st	209.39	1.71	164.51	4.08	Area	44.88
NO_2	283300	4381900	31.61	Annual	All	1st	191.64	1.82	145.74	5.56	Area	45.90
NO_2	283100	4381900	31.49	Annual	All	1st	189.82	1.89	144.80	4.93	Area	45.02
NO_2	283300	4382000	31.08	Annual	All	1st	209.29	1.73	164.66	4.92	Area	44.63
NO_2	283000	4382500	31.07	Annual	All	1st	272.81	1.19	228.00	4.58	Area	44.81
NO_2	283100	4382000	31.01	Annual	All	1st	208.63	1.64	163.97	4.97	Area	44.66
NO_2	281000	4382250	30.50	Annual	All	1st	245.70	1.50	200.26	6.28	Area	45.44
NO_2	283300	4382200	30.39	Annual	All	1st	231.47	1.47	190.19	2.22	Area	41.28
NO_2	283000	4381900	30.38	Annual	All	1st	190.51	1.82	144.98	6.85	Area	45.53
NO_2	283300	4382500	30.30	Annual	All	1st	268.71	1.24	226.64	2.92	Area	42.07
NO_2	283500	4381800	30.22	Annual	All	1st	178.55	1.61	132.64	7.23	Area	45.91
NO_2	282900	4382400	30.12	Annual	All	1st	277.22	1.21	230.40	7.87	Area	46.82
NO_2	283500	4382000	30.04	Annual	All	1st	213.70	1.71	167.42	7.93	Area	46.28
NO_2	283300	4382100	29.97	Annual	All	1st	223.11	1.58	181.05	3.68	Area	42.06
NO_2	281250	4382000	29.93	Annual	All	1st	226.27	1.65	180.53	7.49	Area	45.74
NO_2	281250	4382250	29.90	Annual	All	1st	268.76	1.44	223.61	6.72	Area	45.15
NO_2	283600	4382000	29.87	Annual	All	1st	219.67	1.68	170.96	10.56	Area	48.71
NO_2	283000	4381600	29.71	Annual	All	1st	157.80	1.75	115.39	4.54	Area	42.41
NO_2	281500	4382000	29.64	Annual	All	1st	233.98	1.70	187.76	8.40	Area	46.22
NO_2	283400	4381900	29.60	Annual	All	1st	189.37	1.75	145.10	6.55	Area	44.27
NO_2	283200	4382200	29.53	Annual	All	1st	228.06	1.41	188.24	1.86	Area	39.82
NO_2	283400	4382100	29.36	Annual	All	1st	225.71	1.62	182.81	5.36	Area	42.90
NO_2	282900	4382500	29.35	Annual	All	1st	273.95	1.19	229.63	6.37	Area	44.32
NO_2	283200	4382100	29.30	Annual	All	1st	219.60	1.51	179.35	3.01	Area	40.25
NO_2	283100	4382600	29.25	Annual	All	1st	265.63	1.18	224.64	3.17	Area	40.99

TABLE 4-4 (Continued)
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2000

Pollutant	UTM East (meters)	UTM North (meters)	Modeled PSD Increment Consumption (μg/m³)	Averaging Period	Source Group	Rank	Current Area Sources (μg/m³)	Current Point Sources (μg/m³)	Baseline Area Sources (μg/m³)	Baseline Point Sources (μg/m³)	Primary Contributor	Primary Contribution (μg/m³)
NO_2	283000	4382600	29.15	Annual	All	1st	266.07	1.17	224.43	3.94	Area	41.64
NO_2	282200	4382200	29.14	Annual	All	1st	266.15	1.33	217.59	11.03	Area	48.56
NO_2	282100	4382400	29.09	Annual	All	1st	263.88	1.24	217.97	8.36	Area	45.91
NO_2	283300	4382300	29.03	Annual	All	1st	232.24	1.41	194.71	1.34	Area	37.53
NO_2	294000	4384500	29.00	Annual	All	1st	236.15	3.42	194.83	6.07	Area	41.32
NO_2	283000	4381500	28.98	Annual	All	1st	149.38	1.65	108.25	4.14	Area	41.13
NO_2	283700	4381800	28.95	Annual	All	1st	180.27	1.55	134.26	8.92	Area	46.01
NO_2	282800	4382400	28.87	Annual	All	1st	277.48	1.21	230.86	9.33	Area	46.62
NO_2	283400	4382200	28.87	Annual	All	1st	277.48	1.52	191.03	4.37	Area	86.45
NO_2	283200	4382500	28.82	Annual	All	1st	257.82	1.22	218.05	2.56	Area	39.77
NO_2	276000	4379000	28.80	Annual	All	1st	198.87	1.50	158.34	3.64	Area	40.53
NO_2	283400	4382000	28.79	Annual	All	1st	206.25	1.70	163.46	6.10	Area	42.79
NO_2	283500	4381900	28.77	Annual	All	1st	189.61	1.68	145.44	7.49	Area	44.17
NO_2	283600	4381800	28.74	Annual	All	1st	178.90	1.54	134.30	7.85	Area	44.60
NO_2	281500	4382250	28.62	Annual	All	1st	271.36	1.38	227.27	7.30	Area	44.09
NO_2	280750	4382250	28.57	Annual	All	1st	208.46	1.56	165.98	5.94	Area	42.48
NO_2	283400	4381800	28.56	Annual	All	1st	167.51	1.71	124.34	6.80	Area	43.17
NO_2	283600	4381700	28.44	Annual	All	1st	165.53	1.52	122.04	7.10	Area	43.49
NO_2	283100	4381800	28.37	Annual	All	1st	157.18	2.08	116.31	5.12	Area	40.87
NO_2	283200	4382300	28.35	Annual	All	1st	232.36	1.34	194.71	1.19	Area	37.65
NO_2	283500	4382100	28.32	Annual	All	1st	230.18	1.66	185.70	8.37	Area	44.48
NO_2	282800	4382500	28.28	Annual	All	1st	274.13	1.18	229.98	7.63	Area	44.15
NO_2	282700	4382400	28.22	Annual	All	1st	277.23	1.21	230.85	9.96	Area	46.38
NO_2	275000	4378000	28.20	Annual	All	1st	171.76	2.64	133.26	3.54	Area	38.50
NO_2	283600	4381900	28.18	Annual	All	1st	191.12	1.63	146.24	8.95	Area	44.88
NO_2	283700	4381700	28.08	Annual	All	1st	166.13	1.50	122.56	7.62	Area	43.57
NO_2	283400	4382500	28.07	Annual	All	1st	265.11	1.28	224.48	4.49	Area	40.63
NO_2	282900	4382600	28.05	Annual	All	1st	267.53	1.17	226.12	5.17	Area	41.41
NO_2	282800	4381500	28.00	Annual	All	1st	149.97	1.83	109.35	5.12	Area	40.62
NO_2	282100	4382500	27.96	Annual	All	1st	259.57	1.20	215.85	7.63	Area	43.72

TABLE 4-4 (Continued)
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2000

Pollutant	UTM East (meters)	UTM North (meters)	Modeled PSD Increment Consumption (μg/m³)	Averaging Period	Source Group	Rank	Current Area Sources (μg/m³)	Current Point Sources (μg/m³)	Baseline Area Sources (μg/m³)	Baseline Point Sources (μg/m³)	Primary Contributor	Primary Contribution (μg/m³)
NO_2	279000	4381000	27.92	Annual	All	1st	189.07	2.21	148.56	5.50	Area	40.51
NO_2	282900	4381400	27.86	Annual	All	1st	142.73	1.69	103.29	3.98	Area	39.44
NO_2	283100	4382100	27.80	Annual	All	1st	219.60	1.46	178.96	5.03	Area	40.64
NO_2	282800	4381400	27.74	Annual	All	1st	140.15	1.81	100.50	4.46	Area	39.65
NO_2	282300	4382200	27.64	Annual	All	1st	265.10	1.31	217.68	11.88	Area	47.42
NO_2	282700	4382500	27.60	Annual	All	1st	273.76	1.18	229.85	8.30	Area	43.91
NO_2	282800	4381300	27.59	Annual	All	1st	136.93	1.51	97.76	3.90	Area	39.17
NO_2	283400	4382300	27.58	Annual	All	1st	234.23	1.46	195.01	3.91	Area	39.22
NO_2	282900	4381500	27.54	Annual	All	1st	148.92	1.74	109.50	4.44	Area	39.42
NO_2	282900	4381900	27.52	Annual	All	1st	191.11	1.70	145.22	10.90	Area	45.89
NO_2	283600	4382100	27.44	Annual	All	1st	239.06	1.71	191.55	12.65	Area	47.51
NO_2	282900	4381300	27.37	Annual	All	1st	136.60	1.57	52.71	3.63	Area	83.89
NO_2	280500	4382000	27.35	Annual	All	1st	202.10	1.88	161.38	6.13	Area	40.72
NO_2	283100	4382200	27.34	Annual	All	1st	227.76	1.37	187.80	4.88	Area	39.96
NO_2	282700	4381300	27.32	Annual	All	1st	137.27	1.38	97.91	4.30	Area	39.36
NO_2	282800	4382600	27.17	Annual	All	1st	267.62	1.16	226.36	6.20	Area	41.26
NO_2	281750	4382000	27.16	Annual	All	1st	230.46	1.69	186.16	9.77	Area	44.30
NO_2	285000	4382000	27.12	Annual	All	1st	226.48	3.80	179.77	14.34	Area	46.71
NO_2	282000	4382400	27.10	Annual	All	1st	252.75	1.24	209.81	8.04	Area	42.94
NO_2	284000	4382000	27.05	Annual	All	1st	232.45	3.00	179.90	19.48	Area	52.55
NO_2	283200	4382400	27.02	Annual	All	1st	234.14	1.27	197.88	1.51	Area	36.26
NO_2	281750	4382250	26.98	Annual	All	1st	249.16	1.36	206.48	8.07	Area	42.68
NO_2	280750	4382500	26.88	Annual	All	1st	190.21	1.56	150.28	5.67	Area	39.93
NO_2	280000	4381500	26.86	Annual	All	1st	208.21	2.36	168.68	6.08	Area	39.53
NO_2	276500	4380000	26.85	Annual	All	1st	192.59	2.19	154.25	4.72	Area	38.34
NO_2	283100	4382300	26.83	Annual	All	1st	232.02	1.30	194.17	3.37	Area	37.85
NO_2	281000	4382000	26.82	Annual	All	1st	217.85	1.64	176.96	6.77	Area	40.89
NO_2	283300	4382400	26.80	Annual	All	1st	235.14	1.31	198.90	1.81	Area	36.24
NO_2	281250	4381750	26.77[A]	Annual	All	1st	178.99	2.55	137.50	8.33	Area	41.49
NO_2	283000	4381800	26.76	Annual	All	1st	172.59	2.07	133.32	5.65	Area	39.27

TABLE 4-4 (Continued)
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2000

Pollutant	UTM East (meters)	UTM North (meters)	Modeled PSD Increment Consumption (μg/m³)	Averaging Period	Source Group	Rank	Current Area Sources (μg/m³)	Current Point Sources (μg/m³)	Baseline Area Sources (μg/m³)	Baseline Point Sources (μg/m³)	Primary Contributor	Primary Contribution (μg/m³)
NO_2	283000	4382000	26.75	Annual	All	1st	205.03	1.54	162.10	8.81	Area	42.93
NO_2	281250	4382500	26.67	Annual	All	1st	243.29	1.43	203.06	6.10	Area	40.23
NO_2	282700	4382600	26.56	Annual	All	1st	267.22	1.16	226.09	6.88	Area	41.13
NO_2	289500	4385500	26.48	Annual	All	1st	224.43	5.39	185.00	9.52	Area	39.43
NO_2	276500	4379500	26.44	Annual	All	1st	223.16	1.62	185.59	3.94	Area	37.57
NO_2	281000	4382500	26.43	Annual	All	1st	206.82	1.48	167.20	5.87	Area	39.62
NO_2	280749.9	4381500	26.30	Annual	All	1st	179.58	6.61	143.80	7.32	Area	35.78
NO_2	283899.9	4381700	26.29	Annual	All	1st	162.63	1.66	120.11	9.13	Area	42.52
NO_2	282100	4382200	26.19	Annual	All	1st	251.17	1.35	207.30	10.31	Area	43.87
NO_2	282300	4382300	26.12	Annual	All	1st	261.56	1.26	217.70	10.29	Area	43.86
NO_2	270500	4376500	26.07	Annual	All	1st	156.03	1.68	120.06	2.90	Area	35.97
NO_2	271000	4377000	26.07	Annual	All	1st	168.55	1.73	132.44	3.07	Area	36.11
NO_2	283000	4382700	26.06	Annual	All	1st	252.85	1.15	215.65	3.61	Area	37.20
NO_2	283800	4381500	26.04	Annual	All	1st	146.61	1.45	107.14	6.19	Area	39.47
NO_2	283700	4381500	26.04	Annual	All	1st	146.83	1.44	107.60	5.96	Area	39.23
NO_2	283200	4382600	26.02	Annual	All	1st	251.24	1.19	214.32	3.42	Area	36.92
NO_2	282600	4382400	26.00	Annual	All	1st	269.91	1.21	226.40	10.05	Area	43.51
NO_2	293500	4384500	25.98	Annual	All	1st	165.17	1.56	127.66	6.49	Area	37.51
NO_2	283500	4382200	25.98	Annual	All	1st	234.04	3.61	192.28	8.68	Area	41.76
NO_2	282700	4381500	25.97	Annual	All	1st	149.00	2.03	110.35	6.06	Area	38.65
NO_2	283800	4381700	25.96	Annual	All	1st	164.84	1.51	123.50	8.23	Area	41.34
NO_2	274000	4377500	25.85	Annual	All	1st	173.46	2.11	137.38	3.23	Area	36.08
NO_2	282000	4382500	25.81	Annual	All	1st	247.87	1.20	207.25	7.42	Area	40.62
NO_2	283900	4381500	25.78	Annual	All	1st	146.02	1.47	106.62	6.49	Area	39.40
NO_2	283800	4381800	25.73	Annual	All	1st	176.66	1.63	133.93	10.04	Area	42.73
NO_2	282600	4382500	25.70	Annual	All	1st	268.06	1.18	226.42	8.55	Area	41.64
NO_2	283300	4381800	25.69	Annual	All	1st	145.03	1.87	106.57	6.09	Area	38.46
NO_2	280499.9	4381750	25.66	Annual	All	1st	230.57	2.26	192.31	6.31	Area	38.26
NO_2	283000	4381700	25.65	Annual	All	1st	162.69	1.97	125.52	4.93	Area	37.17
NO_2	280500	4381000	25.62	Annual	All	1st	154.88	2.26	116.09	6.90	Area	38.79

TABLE 4-4 (Continued)
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2000

Pollutant	UTM East (meters)	UTM North (meters)	Modeled PSD Increment Consumption ($\mu g/m^3$)	Averaging Period	Source Group	Rank	Current Area Sources ($\mu g/m^3$)	Current Point Sources ($\mu g/m^3$)	Baseline Area Sources ($\mu g/m^3$)	Baseline Point Sources ($\mu g/m^3$)	Primary Contributor	Primary Contribution ($\mu g/m^3$)
NO_2	283999.9	4381800	25.61	Annual	All	1st	175.47	2.25	130.85	12.72	Area	44.62
NO_2	283899.9	4381800	25.57	Annual	All	1st	177.99	1.84	134.36	11.37	Area	43.63
NO_2	282500	4381400	25.44	Annual	All	1st	144.03	1.34	104.59	6.86	Area	39.44
NO_2	284999.9	4382250	25.35	Annual	All	1st	281.32	3.61	236.89	14.23	Area	44.43
NO_2	271000	4376500	25.29	Annual	All	1st	165.85	1.74	130.96	2.91	Area	34.89
NO_2	283700	4381600	25.28	Annual	All	1st	153.84	1.47	114.99	6.62	Area	38.85
NO_2	282200	4382500	25.27	Annual	All	1st	256.52	1.20	216.13	7.90	Area	40.39
NO_2	281000	4381750	25.26	Annual	All	1st	196.98	1.86	157.74	7.43	Area	39.24
NO_2	274000	4377000	25.21	Annual	All	1st	138.15	1.73	103.10	2.78	Area	35.05
NO_2	284000	4381400	25.20	Annual	All	1st	136.66	1.51	98.55	6.01	Area	38.11
NO_2	282000	4382300	25.19	Annual	All	1st	245.74	1.30	206.54	8.80	Area	39.20
NO_2	282700	4381400	25.18	Annual	All	1st	130.41	1.89	93.58	5.15	Area	36.83
NO_2	283000	4381400	25.15	Annual	All	1st	126.18	1.45	90.38	3.99	Area	35.80
NO_2	282000	4382100	25.15	Annual	All	1st	236.82	1.72	194.03	10.72	Area	42.79
NO_2	276500	4379000	25.13	Annual	All	1st	160.23	1.46	124.54	3.64	Area	35.69
NO_2	282600	4381400	25.13	Annual	All	1st	134.29	1.61	96.46	5.94	Area	37.83
NO_2	282900	4381800	25.04	Annual	All	1st	172.66	2.05	133.52	7.80	Area	39.14
NO_2	282900	4381600	25.03	Annual	All	1st	154.06	1.87	117.49	5.07	Area	36.57
PM_{10}	273500	4371500	61.38[B]	24-Hour	All	2nd	23.06	73.37	29.70	5.35	Point	68.02
PM_{10}	274000	4372000	61.14[B]	24-Hour	All	2nd	23.30	71.51	29.08	4.59	Point	66.92
PM_{10}	275000	4373000	59.49[B]	24-Hour	All	2nd	25.79	113.35	3.49	76.16	Point	37.20
PM_{10}	280000	4385000	58.27	24-Hour	All	2nd	72.76	3.85	15.58	2.75	Area	57.17
PM_{10}	280500	4385000	57.35	24-Hour	All	2nd	72.78	3.67	17.57	1.53	Area	55.20
PM_{10}	279500	4385000	56.76	24-Hour	All	2nd	74.01	1.82	15.88	3.20	Area	58.13
PM_{10}	274500	4372500	52.85[B]	24-Hour	All	2nd	56.91	46.62	19.13	31.55	Area	37.77
PM_{10}	282500	4385500	51.78	24-Hour	All	2nd	68.59	3.64	14.26	6.19	Area	54.33
PM_{10}	277500	4385000	51.01	24-Hour	All	2nd	68.61	1.88	17.97	1.51	Area	50.63
PM_{10}	280000	4385500	50.45	24-Hour	All	2nd	68.47	1.81	15.32	4.50	Area	53.15
PM_{10}	277000	4384500	50.00	24-Hour	All	2nd	67.77	2.07	18.08	1.76	Area	49.69
PM_{10}	277500	4384500	49.82	24-Hour	All	2nd	68.81	2.32	19.48	1.82	Area	49.33

TABLE 4-4 (Continued)
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2000

Pollutant	UTM East (meters)	UTM North (meters)	Modeled PSD Increment Consumption (μg/m^3)	Averaging Period	Source Group	Rank	Current Area Sources (μg/m^3)	Current Point Sources (μg/m^3)	Baseline Area Sources (μg/m^3)	Baseline Point Sources (μg/m^3)	Primary Contributor	Primary Contribution (μg/m^3)
PM_{10}	276500	4384500	49.65	24-Hour	All	2nd	66.72	2.06	17.16	1.98	Area	49.56
PM_{10}	275000	4384500	48.47	24-Hour	All	2nd	63.70	2.80	15.32	2.71	Area	48.38
PM_{10}	279000	4384500	47.96	24-Hour	All	2nd	68.72	3.74	22.89	1.60	Area	45.83
PM_{10}	273000	4371500	47.92	24-Hour	All	2nd	36.06	41.82	28.27	1.70	Point	40.13
PM_{10}	271500	4382000	47.75	24-Hour	All	2nd	70.89	0.78	22.60	1.32	Area	48.29
PM_{10}	272500	4371000	47.36	24-Hour	All	2nd	34.47	41.30	26.67	1.72	Point	39.57
PM_{10}	275500	4384500	47.33	24-Hour	All	2nd	65.02	2.95	15.48	5.17	Area	49.55
PM_{10}	276000	4384500	47.22	24-Hour	All	2nd	66.08	2.76	16.85	4.77	Area	49.23
PM_{10}	274500	4384500	46.92	24-Hour	All	2nd	62.33	2.42	14.61	3.22	Area	47.72
PM_{10}	275500	4385000	46.60	24-Hour	All	2nd	62.74	1.83	16.41	1.56	Area	46.33
PM_{10}	274500	4385000	46.39	24-Hour	All	2nd	59.74	1.61	13.73	1.22	Area	46.01
PM_{10}	275000	4385000	46.23	24-Hour	All	2nd	60.97	1.43	15.15	1.03	Area	45.82
PM_{10}	274000	4384500	46.12	24-Hour	All	2nd	61.25	2.29	14.43	3.00	Area	46.83
PM_{10}	272000	4382000	46.09	24-Hour	All	2nd	71.29	0.88	24.70	1.38	Area	46.58
PM_{10}	278000	4385000	46.05	24-Hour	All	2nd	71.58	3.37	17.51	11.39	Area	54.07
PM_{10}	273000	4382500	45.43	24-Hour	All	2nd	67.66	1.89	19.53	4.59	Area	48.13
PM_{10}	277000	4385000	45.33	24-Hour	All	2nd	68.11	2.99	18.38	7.39	Area	49.73
PM_{10}	276000	4385000	44.36	24-Hour	All	2nd	65.05	2.74	17.51	5.92	Area	47.54
PM_{10}	272500	4382000	44.27	24-Hour	All	2nd	71.76	0.98	26.98	1.48	Area	44.78
PM_{10}	278500	4385000	43.87	24-Hour	All	2nd	73.22	3.68	12.13	20.90	Area	61.09
PM_{10}	273500	4382500	43.43	24-Hour	All	2nd	70.54	1.18	21.03	7.26	Area	49.51
PM_{10}	272500	4382500	42.84	24-Hour	All	2nd	66.47	1.95	19.02	6.56	Area	47.45
PM_{10}	283500	4385500	41.94	24-Hour	All	2nd	76.59	2.11	36.55	0.21	Area	40.04
PM_{10}	276500	4385000	41.72	24-Hour	All	2nd	67.29	3.35	17.85	11.07	Area	49.44
PM_{10}	272000	4370500	41.66	24-Hour	All	2nd	34.35	35.29	26.27	1.71	Point	33.59
PM_{10}	275000	4382500	41.64	24-Hour	All	2nd	70.33	1.27	28.43	1.52	Area	41.90
PM_{10}	274000	4384000	41.05	24-Hour	All	2nd	60.45	1.91	19.28	2.03	Area	41.18
PM_{10}	283000	4386000	40.96	24-Hour	All	2nd	55.61	3.51	17.24	0.92	Area	38.37
PM_{10}	273000	4382000	40.74	24-Hour	All	2nd	73.63	1.13	20.88	13.15	Area	52.75
PM_{10}	282000	4385500	40.48	24-Hour	All	2nd	69.14	3.94	12.95	19.65	Area	56.19

TABLE 4-4 (Continued)
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2000

Pollutant	UTM East (meters)	UTM North (meters)	Modeled PSD Increment Consumption (μg/m^3)	Averaging Period	Source Group	Rank	Current Area Sources (μg/m^3)	Current Point Sources (μg/m^3)	Baseline Area Sources (μg/m^3)	Baseline Point Sources (μg/m^3)	Primary Contributor	Primary Contribution (μg/m^3)
PM_{10}	274500	4384000	40.15	24-Hour	All	2nd	61.77	3.23	21.51	3.34	Area	40.26
PM_{10}	275500	4384000	39.79	24-Hour	All	2nd	62.85	2.50	22.85	2.71	Area	40.01
PM_{10}	274000	4382500	39.60	24-Hour	All	2nd	70.74	1.40	21.47	11.08	Area	49.28
PM_{10}	275500	4385500	39.53	24-Hour	All	2nd	55.91	1.84	16.48	1.74	Area	39.42
PM_{10}	275000	4384000	39.46	24-Hour	All	2nd	62.03	3.43	22.50	3.50	Area	39.53
PM_{10}	273000	4371000	39.35	24-Hour	All	2nd	16.87	51.09	26.34	2.28	Point	48.82
PM_{10}	283000	4385500	39.29	24-Hour	All	2nd	61.62	13.66	6.46	29.54	Area	55.16
PM_{10}	273500	4382000	39.01	24-Hour	All	2nd	71.74	0.95	32.10	1.58	Area	39.64
PM_{10}	275000	4385500	39.00	24-Hour	All	2nd	54.51	1.71	15.65	1.57	Area	38.86
PM_{10}	276000	4384000	38.87	24-Hour	All	2nd	62.44	2.29	23.53	2.33	Area	38.91
PM_{10}	278500	4384500	38.73	24-Hour	All	2nd	69.31	4.59	17.54	17.63	Area	51.78
PM_{10}	271500	4370500	38.62	24-Hour	All	2nd	48.26	17.40	26.05	0.99	Area	22.22
PM_{10}	279000	4385000	38.36	24-Hour	All	2nd	74.31	3.08	12.72	26.31	Area	61.59
PM_{10}	271000	4370000	38.09	24-Hour	All	2nd	47.38	15.57	23.65	1.21	Area	23.73
PM_{10}	272500	4370500	37.78	24-Hour	All	2nd	45.22	19.20	25.45	1.20	Area	19.77
PM_{10}	276500	4384000	37.32	24-Hour	All	2nd	61.75	2.49	24.69	2.23	Area	37.06
PM_{10}	283500	4386000	37.11	24-Hour	All	2nd	56.52	3.36	22.65	0.11	Area	33.87
PM_{10}	272000	4371000	36.31	24-Hour	All	2nd	47.92	16.09	26.42	1.28	Area	21.50
PM_{10}	272000	4370000	36.27	24-Hour	All	2nd	45.24	16.99	23.63	2.33	Area	21.61
PM_{10}	282500	4386000	36.22	24-Hour	All	2nd	55.76	3.45	21.59	1.39	Area	34.17
PM_{10}	274000	4382000	36.10[B]	24-Hour	All	2nd	71.68	1.05	34.91	1.72	Area	36.77
PM_{10}	279500	4384500	35.74	24-Hour	All	2nd	76.95	4.28	33.12	12.37	Area	43.83
PM_{10}	274000	4371500	35.70[B]	24-Hour	All	2nd	68.76	4.90	12.62	25.34	Area	56.14
PM_{10}	282000	4385000	35.69	24-Hour	All	2nd	33.33	30.06	26.59	1.10	Point	28.96
PM_{10}	276000	4382500	35.65	24-Hour	All	2nd	69.46	1.69	33.83	1.67	Area	35.63
PM_{10}	271500	4370000	35.49	24-Hour	All	2nd	71.71	5.32	14.20	27.34	Area	57.51
PM_{10}	281000	4385500	35.45	24-Hour	All	2nd	46.55	15.56	24.61	2.06	Area	21.94
PM_{10}	284500	4385500	35.37	24-Hour	All	2nd	60.10	3.25	17.66	10.32	Area	42.43
PM_{10}	276500	4385500	35.34	24-Hour	All	2nd	78.25	2.28	44.18	1.01	Area	34.08
PM_{10}	277000	4384000	35.32	24-Hour	All	2nd	61.28	2.67	26.23	2.40	Area	35.05

TABLE 4-4 (Continued)
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2000

Pollutant	UTM East (meters)	UTM North (meters)	Modeled PSD Increment Consumption (μg/m^3)	Averaging Period	Source Group	Rank	Current Area Sources (μg/m^3)	Current Point Sources (μg/m^3)	Baseline Area Sources (μg/m^3)	Baseline Point Sources (μg/m^3)	Primary Contributor	Primary Contribution (μg/m^3)
PM_{10}	277500	4384000	35.09	24-Hour	All	2nd	63.29	2.71	28.19	2.72	Area	35.10
PM_{10}	273500	4370500	34.96	24-Hour	All	2nd	32.12	29.12	25.02	1.27	Point	27.85
PM_{10}	278500	4385500	34.84	24-Hour	All	2nd	65.13	2.37	12.50	20.16	Area	52.63
PM_{10}	276000	4385500	34.72	24-Hour	All	2nd	58.65	3.15	17.23	9.85	Area	41.42
PM_{10}	283500	4385000	34.66	24-Hour	All	2nd	79.79	7.89	44.86	8.16	Area	34.93
PM_{10}	274500	4382500	34.52	24-Hour	All	2nd	71.30	1.72	21.33	17.17	Area	49.97
PM_{10}	273500	4383500	34.48	24-Hour	All	2nd	59.62	1.70	24.80	2.04	Area	34.82
PM_{10}	275000	4383000	34.28	24-Hour	All	2nd	64.56	1.63	22.08	9.82	Area	42.48
PM_{10}	275500	4382500	34.17	24-Hour	All	2nd	70.53	1.76	21.41	16.71	Area	49.12
PM_{10}	271000	4369500	33.99	24-Hour	All	2nd	46.07	12.56	23.02	1.62	Area	23.06
PM_{10}	271000	4369000	33.93	24-Hour	All	2nd	44.58	12.39	21.46	1.59	Area	23.12
PM_{10}	275500	4383000	33.83	24-Hour	All	2nd	64.13	1.58	22.02	9.85	Area	42.11
PM_{10}	269500	4369000	33.70	24-Hour	All	2nd	50.60	10.54	26.80	0.64	Area	23.80
PM_{10}	271500	4369500	33.56	24-Hour	All	2nd	45.74	14.59	23.69	3.09	Area	22.06
PM_{10}	271000	4370500	33.37	24-Hour	All	2nd	48.82	10.74	24.77	1.42	Area	24.04
PM_{10}	271500	4381500	33.27	24-Hour	All	2nd	66.78	0.66	32.99	1.19	Area	33.80
PM_{10}	277000	4385500	33.23	24-Hour	All	2nd	62.02	4.40	17.48	15.71	Area	44.54
PM_{10}	284000	4385500	32.66	24-Hour	All	2nd	68.85	11.00	18.87	28.32	Area	49.98
PM_{10}	284000	4386000	32.61	24-Hour	All	2nd	55.50	8.28	31.01	0.16	Area	24.48
PM_{10}	274000	4383500	32.48	24-Hour	All	2nd	59.32	1.88	26.24	2.48	Area	33.08
PM_{10}	282000	4386000	32.46	24-Hour	All	2nd	56.47	3.66	9.12	18.55	Area	47.35
PM_{10}	270500	4369000	32.29	24-Hour	All	2nd	46.69	10.43	23.42	1.41	Area	23.27
PM_{10}	283500	4386500	32.20	24-Hour	All	2nd	44.28	6.32	17.35	1.06	Area	26.93
PM_{10}	270500	4369500	32.16	24-Hour	All	2nd	50.74	7.44	25.44	0.58	Area	25.30
PM_{10}	272500	4370000	32.16	24-Hour	All	2nd	48.77	13.04	29.65	0.00	Area	19.12
PM_{10}	281500	4385500	32.05	24-Hour	All	2nd	70.14	4.69	13.54	29.25	Area	56.60
PM_{10}	269000	4369000	31.97	24-Hour	All	2nd	51.33	8.34	26.91	0.79	Area	24.42
PM_{10}	275500	4373000	31.69	24-Hour	All	2nd	34.64	48.82	29.67	22.10	Point	26.72
PM_{10}	273000	4370000	31.61	24-Hour	All	2nd	32.46	24.70	24.86	0.70	Point	24.00
PM_{10}	272000	4372500	31.50	24-Hour	All	2nd	16.89	43.29	26.76	1.92	Point	41.38

TABLE 4-4 (Continued)
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2000

Pollutant	UTM East (meters)	UTM North (meters)	Modeled PSD Increment Consumption (µg/m³)	Averaging Period	Source Group	Rank	Current Area Sources (µg/m³)	Current Point Sources (µg/m³)	Baseline Area Sources (µg/m³)	Baseline Point Sources (µg/m³)	Primary Contributor	Primary Contribution (µg/m³)
PM_{10}	272000	4369500	31.32	24-Hour	All	2nd	49.11	7.04	24.11	0.71	Area	24.99
PM_{10}	278500	4384000	31.30	24-Hour	All	2nd	66.65	2.89	2.02	36.21	Area	64.63
PM_{10}	284000	4386500	31.27	24-Hour	All	2nd	45.18	6.04	19.86	0.08	Area	25.32
PM_{10}	272500	4371500	31.20	24-Hour	All	2nd	48.68	10.85	27.31	1.01	Area	21.37
PM_{10}	278000	4385500	31.01	24-Hour	All	2nd	51.52	7.47	25.47	2.51	Area	26.05
PM_{10}	273000	4370500	31.01	24-Hour	All	2nd	64.97	5.37	12.37	26.96	Area	52.60
PM_{10}	276500	4382500	30.96	24-Hour	All	2nd	68.41	1.12	36.76	1.81	Area	31.64
PM_{10}	280500	4385500	30.92	24-Hour	All	2nd	71.13	1.86	9.90	32.17	Area	61.23
PM_{10}	274500	4383500	30.82	24-Hour	All	2nd	63.34	1.83	22.56	11.79	Area	40.78
PM_{10}	273500	4383000	30.81	24-Hour	All	2nd	59.40	1.95	27.75	2.79	Area	31.66
PM_{10}	273500	4371000	30.68	24-Hour	All	2nd	52.21	6.66	25.70	2.49	Area	26.51
PM_{10}	270000	4369500	30.63	24-Hour	All	2nd	49.86	11.63	29.92	0.95	Area	19.95
PM_{10}	274500	4372000	30.55[B]	24-Hour	All	2nd	47.85	13.89	29.33	1.87	Area	18.52
PM_{10}	276000	4383500	30.52	24-Hour	All	2nd	63.12	2.06	31.64	3.02	Area	31.48
PM_{10}	270500	4370000	30.36	24-Hour	All	2nd	50.09	11.56	30.12	1.17	Area	19.97
PM_{10}	284249.9	4385000	30.29	24-Hour	All	2nd	86.35	4.33	59.60	0.80	Area	26.76
PM_{10}	277500	4385500	30.27	24-Hour	All	2nd	63.68	6.59	17.15	22.86	Area	46.54
PM_{10}	269500	4369500	30.16	24-Hour	All	2nd	49.42	7.93	26.43	0.76	Area	22.99
PM_{10}	271500	4371000	30.16	24-Hour	All	2nd	46.46	6.40	22.22	0.49	Area	24.25
PM_{10}	272000	4381500	30.14	24-Hour	All	2nd	51.85	8.45	30.17	0.00	Area	21.69
PM_{10}	271500	4369000	30.13	24-Hour	All	2nd	66.63	0.68	35.69	1.48	Area	30.94
PM_{10}	275500	4383500	30.07	24-Hour	All	2nd	61.42	2.31	30.51	3.16	Area	30.91

Notes:

[A] Value modeled at a receptor inside Kal Kan fenceline
[B] Value modeled at a receptor inside All-Lite fenceline

TABLE 4-5

COMPARITIVE ANALYSIS FOR MODELED ANNUAL NO_2 PSD INCREMENT CONSUMPTION USING 100% AND 60% AREA SOURCE EMISSIONS AND 2000 METEOROLOGICAL DATA

X-Location	Y-Location	Modeled PSD Increment Consumption Using 100% Area Source Emissions ($\mu g/m^3$)	Modeled PSD Increment Consumption Using 60% Area Source Emissions ($\mu g/m^3$)
283100	4382400	34.08	19.95
287000	4382000	32.40	20.46
283000	4382400	32.35	18.12
283200	4381900	32.33	18.56
283200	4382000	31.88	18.41
283300	4381900	31.61	17.84
283100	4381900	31.49	17.98
283300	4382000	31.08	17.69
283000	4382500	31.07	17.62
283100	4382000	31.01	17.61

PM_{10}

PM_{10} modeling showed compliance with the annual PM_{10} PSD increments. However, there were isolated areas of predicted exceedences of the 24-hour PM_{10} PSD increments.

The modeling was completed using existing input data from the increment tracking database, with updated source input for Sierra Pacific's Tracy Generating Station, Kal Kan, Eagle-Picher, Naniwa, All-Lite Aggregates, and Alcoa. These updated data were provided by NDEP. The area source data was also updated by Tetra Tech using an updated threshold value of 6.5E-09 g/s-m^2. The model results showed two general areas where 24-hour PM_{10} PSD increment exceedences were predicted outside facility fencelines in HA83: 1) the area near the All-Lite Aggregate facility and 2) an area north and northeast of the Tracy facility. Although there were updates to the facility and area source inventories, these exceedences were still predicted. Figures 4-8a through 4-10b (Appendix C) present the location and magnitude of PM_{10} increment consumption in HA83 for 24-hour and annual averaging periods.

The model results for 2000 meteorological year runs indicate there are 124 receptors where the 24-hour PM_{10} increment is exceeded; however, not all of these exceedences are in ambient are outside facility fencelines. The predicted highest, second-high exceedence outside any facility's fencelines using 2000 meteorological data is 58.2 $\mu g/m^3$. There were 27 exceedences predicted using 2001 meteorological data, and the modeled highest, second-high value outside any facility's fencelines was 51.5 $\mu g/m^3$. Tables 4-4 and 4-6 show a breakdown of the predicted PM_{10} exceedences for the 2000 and 2001 model years, respectively. This breakdown indicates whether PM_{10} increment consumption at each receptor location is due to area sources or point sources. Figures 4-9a and 4-9b (Appendix C) show a detailed inset of PM_{10} impacts in HA83 for 2000 and 2001 24-hour averaging periods.

Norm Possiel of EPA provided an EPA study on *Procedures for Developing Base Year and Future Year Mass and Modeling Inventories for the Heavy-Duty Diesel Rulemaking* (EPA 2000). The study acknowledges that ISCST3 and AERMOD over predict resultant concentrations from ground level fugitive sources. The study applies an adjustment factor of 25% to account for large-scale transport of local PM_{10} fugitive emissions. In the NDEP Truckee River Corridor study, 100% of area source emissions were used, and the detected exceedences near Tracy can be attributed to area sources. In a comparative analysis, Tetra Tech modeled with only the EPA recommended 25% of the area source emissions, and under this condition, no exceedences caused by area source emissions are predicted north and northeast of Tracy. Table 4-7 shows the modeling results from studies using 100%, 25% and 0% of the area source emissions. This table serves as a comparative analysis for how the area source inventory is affecting modeled PSD increment consumption in HA83.

TABLE 4-6
FACILITY CONTRIBUTIONS TO THE PSD INCREMENT CONSUMPTION IN HA83 FOR 2001

Pollutant	UTM East (meters)	UTM North (meters)	PSD Increment ($\mu g/m^3$)	Averaging Period	Source Group	Rank	Current Area Sources ($\mu g/m^3$)	Current Point Sources ($\mu g/m^3$)	Baseline Area Sources ($\mu g/m^3$)	Baseline Point Sources ($\mu g/m^3$)	Primary Contributor	Primary Contribution ($\mu g/m^3$)
PM_{10}	275000	4373000	122.83[A]	24-hour	All	2nd	9.55	192.93	3.49	76.16	Point	116.78
PM_{10}	268500	4374500	51.51	24-hour	All	2nd	87.28	1.82	36.88	0.72	Area	50.40
PM_{10}	268500	4375000	49.14	24-hour	All	2nd	92.45	1.54	43.95	0.91	Area	48.51
PM_{10}	269000	4375000	45.75	24-hour	All	2nd	90.98	1.64	45.90	0.97	Area	45.08
PM_{10}	269500	4375500	45.33	24-hour	All	2nd	96.17	1.26	50.45	1.66	Area	45.73
PM_{10}	269000	4374500	45.07	24-hour	All	2nd	84.65	1.89	39.69	1.77	Area	44.96
PM_{10}	269500	4375000	44.25	24-hour	All	2nd	89.55	1.53	42.71	4.12	Area	46.84
PM_{10}	269000	4375500	42.95	24-hour	All	2nd	95.07	1.17	50.05	3.24	Area	45.02
PM_{10}	270000	4375500	41.03	24-hour	All	2nd	93.37	1.26	51.96	1.64	Area	41.41
PM_{10}	273000	4370500	38.90	24-hour	All	2nd	42.54	24.34	25.47	2.51	Point	21.83
PM_{10}	273500	4371000	38.65	24-hour	All	2nd	43.29	23.55	25.70	2.49	Point	21.06
PM_{10}	272500	4370000	36.93	24-hour	All	2nd	42.18	20.76	25.44	0.58	Point	20.18
PM_{10}	270000	4375000	35.93	24-hour	All	2nd	84.43	1.47	48.07	1.90	Area	36.36
PM_{10}	268500	4375500	35.85	24-hour	All	2nd	90.00	3.42	54.62	2.95	Area	35.38
PM_{10}	272000	4369500	34.67	24-hour	All	2nd	41.07	18.42	24.11	0.71	Point	17.71
PM_{10}	271500	4369000	33.87	24-hour	All	2nd	40.20	16.38	22.22	0.49	Area	17.98
PM_{10}	268500	4374000	33.67	24-hour	All	2nd	68.63	5.11	38.75	1.32	Area	29.88
PM_{10}	273000	4371500	33.21	24-hour	All	2nd	46.12	17.06	28.27	1.70	Area	17.85
PM_{10}	269500	4374500	32.80	24-hour	All	2nd	72.75	7.06	44.87	2.13	Area	27.88
PM_{10}	271000	4368500	32.38	24-hour	All	2nd	39.58	14.59	19.64	2.15	Area	19.94
PM_{10}	270500	4375500	32.36	24-hour	All	2nd	91.20	1.63	55.46	5.00	Area	35.74
PM_{10}	283000	4386000	31.89	24-hour	All	2nd	46.67	3.37	17.24	0.92	Area	29.43
PM_{10}	274500	4373000	31.49[A]	24-hour	All	2nd	6.41	92.73	49.95	17.71	Point	75.03
PM_{10}	274500	4372000	30.78[A]	24-hour	All	2nd	28.41	33.57	29.33	1.87	Point	31.70
PM_{10}	274000	4371500	30.74[A]	24-hour	All	2nd	31.35	27.08	26.59	1.10	Point	25.98
PM_{10}	268000	4375500	30.12	24-hour	All	2nd	84.99	4.03	55.73	3.17	Area	29.27
PM_{10}	283000	4386500	30.03	24-hour	All	2nd	43.01	2.37	14.60	0.74	Area	28.41

Notes:

[A] Value modeled at a receptor inside All-Lite fenceline

TABLE 4-7
COMPARITIVE ANALYSIS FOR MODELED 24-HOUR PM10 PSD INCREMENT CONSUMPTION USING 100%, 25%, AND 0% AREA SOURCE EMISSIONS AND 2000 METEOROLOGICAL DATA

X-Location	Y-Location	Modeled PSD Increment Consumption Using 100% Area Source Emissions (µg/m^3)	Modeled PSD Increment Consumption Using 25% Area Source Emissions (µg/m^3)	Modeled PSD Increment Consumption Using 0% Area Source Emissions (µg/m^3)
280000	4385000	58.27	11.52	5.67
280500	4385000	57.35	14.11	4.35
279500	4385000	56.76	12.12	-0.95
274500	4372500	52.85	30.17	21.27
282500	4385500	51.78	5.64	-5.86
277500	4385000	51.01	12.45	1.50
280000	4385500	50.45	5.86	-5.17
277000	4384500	50.00	11.65	0.45
277500	4384500	49.82	10.05	-1.77
276500	4384500	49.65	11.51	2.30

4.6.3 HA85

SO_2 increment consumption was modeled for HA85 using the protocol described in Section 4.2 through Section 4.5. No exceedences in HA85 of the 3-hour, 24-hour, or annual SO_2 increment thresholds were predicted. The distribution of 3-hour, 24-hour and annual SO_2 impacts in HA85 are presented in Figures 4-11a, 4-11b, 4-12a, 4-12b, 4-13a, and 4-13b (Appendix C). Table 4-8 presents the highest second-high predicted impacts for modeling with the 2000 and the 2001 meteorological data for HA 85.

The increment consumption in this area is primarily due to changes in population and traffic since the baseline year of 1996. Also seen from the figures, vast areas of HA85 have increment expansion. This is mostly due to reductions in SO_2 emissions from vehicles, and Sierra Pacific's reduced SO_2 emissions from their boilers.

TABLE 4-8
HA85 **SO_2** PSD INCREMENT CONSUMPTION

Averaging Period	2000 Modeled SO_2 Increment Consumption ($\mu g/m^3$)	2001 Modeled SO_2 Increment Consumption ($\mu g/m^3$)	SO_2 Increment Limit ($\mu g/m^3$)
3-Hour[1]	8.953	9.682	512
24-Hour[1]	2.049	3.023	91
Annual[2]	-0.008	-0.016	20

Notes:

[1] High Second-High
[2] Maximum

4.7 SUMMARY AND CONCLUSIONS

This study has presented a PSD increment consumption analysis for 3 planning areas in Western Nevada, HA76, HA83, and HA85. The modeling of impacts described in this study predicted compliance with 3-hour, 24-hour, and annual SO_2 PSD increments in HA76, HA83, and HA85 and compliance with annual PM_{10} PSD increments in HA83. The study predicted exceedences of the annual NO_2 increments and 24-hour PM_{10} increments in HA83. Tables 4-5 and 4-6 present a summary of the predicted 24-hour PM_{10} exceedences in HA83. Fugitive area sources significantly contribute to the predicted NO_2 exceedences in HA83. The highest predicted 24-hour PM_{10} exceedences in HA83 were due to impacts from All-Lite Aggregates. Significant refinement of point source input in HA83 was performed in this analysis. Further refinement of the point source database for increment consuming PM_{10} emissions in HA83 may further affect the predicted exceedences of PSD increments in HA83.

5.0 REFERENCES

U.S. Environmental Protection Agency (EPA). 1990. "New Source Review Workshop Manual - Prevention of Significant Deterioration and Nonattainment Area Permitting (Draft)." Office of Air Quality Planning and Standards. Research Triangle Park, NC.

EPA. 1998. "Guideline on Air Quality Models (Revised)." 40 Code of Federal Regulations, Part 51, Appendix W. Office of Air Quality Planning and Standards. Research Triangle Park, NC.

EPA. 2000. "Procedures for Developing Base Year and Future Year Mass and Modeling Inventories for the Heavy-Duty Diesel (HDD) Rulemaking." Office of Air Quality Planning and Standards. Research Triangle Park, NC.

http://www.epa.gov/air/data. U.S. EPA AIRData. Office of Air Quality Planning and Standards. Information Transfer & Program Integration Division. Research Triangle Park, NC.

Federal Register. 2000.

Texas Commission on Environmental Quality. 2002. "Modeling Adjustment Factor for Fugitive Emissions." Air Pollution Division. 12100 Park 35 Circle, Austin, TX.